Director, Operational Test and Evaluation

FY 2004
Annual Report

DoD Programs
Missile Defense, Chemical and Biological, Health Systems, Logistics, Support Systems

Army Programs
Aviation, C4I, Armored Vehicles, Fire Support, Munitions, UAV Systems

Navy and Marine Corps Programs
Amphibious Systems, Surface Ships, Mine Warfare Systems, EW, Submarine Systems, Munitions, C4I, Aviation Systems, UAV Systems

Air Force Programs
Aircraft Systems, Space Systems, Munitions, C4I, Avionics, UAV Systems

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DIRECTOR'S INTRODUCTION

This year has been very active and productive for the office of the Director, Operational Test and Evaluation (DOT&E). In support of our core mission, in FY04 my staff oversaw the planning and execution of OT&E and live fire test and evaluation (LFT&E) for some 200 systems being developed and acquired by our military Services. I provided to the Secretary of Defense and Congress beyond low-rate initial production (BLRIP) reports on the operational effectiveness, suitability, and survivability of 14 systems scheduled to enter full-rate production and fielding to our combat forces. This report fulfills my Title 10 annual report requirement. I will submit my report on missile defense in February 2005, as required by law.

My office continued to address critical issues highlighted in last year's annual report: transforming T&E to maintain its relevance and influence while dealing with changing acquisition approaches, testing complex systems in a system-of-systems context, and funding to rebuild our T&E infrastructure.

TESTING SYSTEMS UNDER NEW ACQUISITION STRATEGIES

We should judge effectiveness and suitability based on how American forces will use a system, not on the acquisition strategy employed in developing and procuring that system. It is difficult to implement that approach if acquisition strategies do not include the Services' development of operational requirements.

In such an environment, the test and evaluation community either ends up with poor criteria against which to measure a new system or it attempts to develop its own. Neither alternative is acceptable. A third alternative of waiting until the test is over and have the user define, or redefine, the requirement, has been implemented on a few systems, but resulted in removing discipline within the process.

Fortunately, the acquisition directive provides guidance that offers, in most cases, a way out. The DoD directive states that the purpose of the whole acquisition system is to provide systems that meet user needs, and to provide a measurable increase in mission capability over existing systems and/or forces. In most cases, a mission focus – compared to the current way of doing the mission – is more than adequate as a measure of effectiveness and suitability. The F-22 offers an example of mission focus during operational testing, and a comparison test with a baseline force to demonstrate a measurable increase in mission capability.

The test and evaluation community has also used combat experience in its evaluations. This year, for example, interviews and surveys of soldiers in Iraq and Afghanistan were a primary source of information in the evaluation of the Force XXI Battle Command Brigade and Below (FBCB2) system. Generally, this is not a good approach to evaluation because it means sending equipment into the field without being able to adequately describe the systems' capabilities and limitations for the soldiers, sailors, airmen, and marines who will use that equipment in combat.

Existing DoD policy does not require the Services to develop, acquire, and deploy non-combat systems with crew protection against ballistic threats. If the user does not specify a requirement for ballistic crew protection, it will not be part of the system design. The Services, Joint Chiefs of Staff, or the Office of the Secretary of Defense (OSD), must define crew protection requirements early. A policy change that requires ballistic crew protection kits for non-combat vehicles operating in a combat zone will significantly reduce risk.

Acquisition strategies now propose buying many systems before testing is complete. This makes fixing problems more expensive, and it involves giving our forces equipment without being able to objectively define the capabilities and limitations on its use.

POOR RELIABILITY - AN ONGOING PROBLEM

I am encouraged by the accomplishments and transformational initiatives of my staff and the service Operational Test Agencies (OTAs). However, I remain concerned about some adverse trends in the testing and fielding of combat equipment to our forces. Of the 14 systems on which we wrote BLRIP reports in FY04, two were not operationally effective, and seven were not operationally suitable. The trend in suitability results is disturbing, as more systems are going to the field despite being unsuitable as tested. In the history of DOT&E reports to Congress since 1983, about 30 percent of systems (36 of 126) were less than suitable. Recent years have witnessed an increase in the number of

systems found unsuitable in operational testing and evaluation. Suitability problems add significantly to the logistics burden and life cycle costs of programs.

The Defense Science Board in 2000 pointed out that 80 percent of defense systems brought to operational test fail to achieve even half of their reliability requirement. This was followed later by data showing that with all the streamlining of the acquisition process, the number of systems failing to meet the reliability requirement has increased. As stated earlier, this trend is evident in the reports DOT&E sends to Congress. The situation has not improved.

Reliability results from operational tests (OTs) appear to be significantly worse than those from development tests (DTs). OT results appear to be a factor of two to four times worse than those from DT and, in some cases, OT results are more than a factor of ten worse than DT. DT gives a false impression of system quality. We must develop methods to account for this phenomenon.

Our forces might derive a misunderstanding of a system's capability from DT alone, unless we perform an OT and collect reliability data. An OT environment is more operationally stressful than that during DT. The difference suggests that failure modes are being missed in DT, where they might be corrected if caught early enough in the design and redesign phase. We should discover reliability problems before OT to avoid the costly fixes and the time delays.

To address this problem, we are working with the acquisition community to develop a new Reliability, Availability, and Maintainability Guide for program managers. This guide will not have the influence of a directive, but it is a good start. Reliability and Maintainability are cost drivers during the entire life of the system. Estimates show that over half the total life cycle cost of a system is attributable to operating and support costs after the system is acquired. This drain on the budget takes money away from other priorities.

MISSILE DEFENSE

I testified twice before Congress in FY04, on Missile Defense. In February 2004, I submitted a separate report, required by law, on my FY03 Assessment of the Ballistic Missile Defense System (BMDS). The immaturity of the system at the time of that report made it difficult to judge its effectiveness. In cooperation with MDA's senior leadership, we have made significant progress during this past year in enhancing and extending the depth of our oversight and ability to conduct more meaningful operational assessments of the MDA programs.

Through a memorandum of agreement, we have established a lead Service Operational Test Agency (OTA) to streamline the interface between the test and evaluation communities and the various MDA program offices. There is now the effective cooperation and communication necessary to provide senior-level decision makers with continuous evaluations of this immense capability-based spiral development program. A subsequent section of this report provides more detail on these activities as well an unclassified updated assessment of the BMDS programs.

TESTING IN A JOINT ENVIRONMENT - THE ROADMAP

During this past year, DOT&E led a collaborative effort to develop a roadmap for establishing a robust joint test and evaluation capability. Once achieved, it will permit the testing of our current and future weapon systems in a joint environment representative of future combat. This pioneering effort, approved by the Deputy Secretary of Defense in November 2004, is the product of unprecedented cooperation among my office, the Joint Staff, Joint Forces Command (JFCOM), several key elements of OSD and the Service T&E agencies.

The roadmap is based on my finding that the successful development of systems and tactics, techniques, and procedures (TTPs) for joint military operations require a change in testing capability and procedures. The most important change in capability will come from the ability to link existing facilities (both testing and training) into a single network to create the complex environment needed to represent joint operations. The procedural changes are designed to ensure that the evaluation of systems is conducted from a joint perspective, not a single Service view.

These changes are essential as the Department continues to move towards an integrated information-sharing environment. Evaluating operational effectiveness will depend on how well systems not only perform individually, but how well they share information within Service functional areas and across functional and Service boundaries to support overall

mission accomplishment. Evaluating single systems and single interfaces will no longer suffice – developing an integrated environment will be the key to determining system and mission operational effectiveness, suitability, and survivability.

Building the capabilities and developing the processes called for in the Roadmap will take time. We cannot wait for the implementation of those enhancements to begin testing in a joint environment. Particularly noteworthy are the plans for evaluating the Army Battle Command System (ABCS). The Army is taking the lead by "experimenting" with a system-of-systems test methodology that should provide all the Service OTAs with lessons learned for future testing of command and control systems.

JOINT T&E

We also completed our restructure of the Joint Test and Evaluation (JT&E) program, streamlining the test nomination process, establishing the Joint Test Support Cell (JTSC), and introducing a Quick Reaction Test (QRT) capability. Combatant Commanders and the Services have noted that JT&Es are now more agile and responsive to operational requirements. The QRT capability is significant because we can now address immediate warfighter concerns within a year, compared to standard JT&E three-year projects.

Joint Survivability (JSURV) was our first QRT. Through it, we developed and delivered convoy survivability procedures to U.S. Central Command (USCENTCOM) to help minimize combat casualties. We distributed over 40,000 copies of the "Combat Convoy Handbook" that are in use by military convoys in Iraq and Afghanistan. Two additional, ongoing QRTs are Joint Shipboard Weapons and Ordnance (JSWORD) and Joint Low Altitude Aircraft Survivability (JLAAS). JSWORD is establishing joint procedures for weapons loading for U.S. Army and U.S. Special Operations Command (USSOCOM) helicopters while operating on U.S. Navy ships. JLAAS is developing TTPs for fixed and rotor wing aircraft that enable them to avoid or defeat potential enemy threats such as Man-Portable Air Defense Systems.

INFORMATION ASSURANCE (IA)

Our initiative to evaluate information assurance (IA) and interoperability during Combatant Command and Service exercises continues to mature. This fiscal year, teams led by the OTAs performed 18 IA evaluations, including two with units scheduled to deploy and one in Iraq. We have made significant progress in identifying operational performance metrics and synchronizing realistic Red Team scenarios with exercise training objectives. These are critical steps in making IA relevant to the warfighter.

We will work with Combatant Command and Service exercise authorities to help transform OT&E. We expect to find more opportunities to satisfy OT&E requirements during exercises while adding value to training. In the next fiscal year, we will perform nearly 30 evaluations. Data from these evaluations will support our first trend analyses.

The IA section of this report fufills the reporting requirement of the FY03 Appropriations Bill.

REBUILDING THE T&E INFRASTRUCTURE

The Department made progress in meeting the 2003 National Defense Authorization Act requirement to establish the Defense Test Resource Management Center (DTRMC). Under the auspices of the Under Secretary of Defense for Acquisition, Technology, and Logistics, a permanent staff began to assemble in May of this year and a Director for the DTRMC took the helm in December 2004. OSD and the Services changed the Department's Financial Management Regulations to restore institutional funding to the Major Range and Test Facilities Base. The FY06 President's Budget should reflect these changes, thus satisfying one of the major items in the legislation.

We still have work to do in developing a strategic plan that will guide future investments in the Department's T&E infrastructure. The plan developed in 2003 and 2004 was not mature enough to support the certifications of FY05 budget adequacy. With a permanent staff under the leadership of a full-time Director, the DTRMC will now be able to develop a strategic plan and assess the adequacy of T&E infrastructure investments to carry out that plan.

Other study efforts continue to highlight the need to improve the resources that support the test and evaluation infrastructure. Most of the cases where a lack of resources poses a significant problem for adequate testing of systems fall

into three categories: instrumentation, targets, and open-air range size and diversity. Funding for test and evaluation doesn't compete well in the Service budgets. Therefore, OSD-sponsored Central T&E Investment Program (CTEIP) becomes more and more important in our attempts to address many of these deficiencies.

T&E INFRASTRUCTURE INVESTMENT AND CTEIP

CTEIP will transfer to the Defense Test Resource Management Center in early 2005. It is an integral part of our effort to provide the enhanced test infrastructure necessary to address the T&E challenges resulting from the Department's transformational initiatives.

The drive for rapid fielding and redesign of systems requires continuous testing and evaluation throughout the development cycle. We will need unprecedented flexibility in our T&E infrastructure to ensure that it is capability, rather than platform-based. New technologies generally require new infrastructure and environmental conditions we have not yet had to replicate. We should not depend on modeling and simulation alone to test these systems at the "edge of the envelope."

CTEIP should be strategically aligned with other T&E stakeholders. A coalition for T&E strategic planning will provide the manpower, adequate funding, and the necessary expertise. In order to achieve the vision of a test infrastructure that is capable of meeting the aforementioned challenges, we must overcome a number of specific obstacles:

- Lack of interoperability due to closed architectures and insufficient standards.
- Insufficient frequency spectrum to support testing.
- Lack of investment in the advanced test infrastructure.

In a subsequent section of this report, we discuss specific CTEIP projects that address each of these obstacles.

CONCLUSION

Four years ago in my first annual report, I promised rigorous tests, support for an infrastructure to do that testing, and "tell-it-like-it-is" reports. Subsequent reports identified needed policy changes and specific investments to achieve those ends. During that time, the Department realigned some responsibilities with respect to T&E. I believe the annual reports over the last four years can serve as a blueprint for action.

Thomas P. Christie

Thomas P. Christie
Director

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DOT&E ACTIVITY SUMMARY

DOT&E activity for FY04 involved oversight of 273 programs, including 49 major automated information systems. Oversight activity begins with the early acquisition milestones, continues through approval for full-rate production and, in some instances, during full production until deleted from the DOT&E oversight list.

Our review of test planning activities for FY04 included approval of 49 Test and Evaluation Master Plans (TEMPs), as well as 51 Operational Test Plans. Live Fire Test and Evaluation (LFT&E) activity included the approval of 16 LFT&E Strategies and Test Plans for inclusion in the TEMPs. In FY04, DOT&E prepared 14 reports for the Secretary of Defense and Congress.

DOT&E also prepared and submitted numerous reports to the Defense Acquisition Board (DAB) principals for consideration in DAB deliberations.

TEST AND EVALUATION MASTER PLANS APPROVED

AGM-154C Joint Standoff Weapon/Unitary Broach

AIM-9X Air-to-Air Missile

Airborne Mine Neutralization System

ALQ-99 Low Band Transmitter (LBT)

Advanced Anti-Radiation Guided Missile AGM-88E (AARGM)

B-2 Advanced Technology Bomber

CH-47F Chinook

Composite Health Care System II (CHCS II)

Cooperative Engagement Capability (CEC), E-2C Integration

CVN-21

DDG-51 Guided Missile Destroyer

Defense Commissary Agency Commissary Advanced Resale Transaction System (CARTS)

Defense Finance and Accounting Service (DFAS) Corporate Database and Warehouse (DCD/DCW)

Deployable Joint Command and Control (DJC2)

Dry Cargo/Ammunition Ship (T-AKE)

E/A-18G

Expeditionary Fighting Vehicle (EFV)

F/A-18E/F

F/A-18E/F APG-79 AESA Phase III Radar Upgrade

F/A-22

Force XXI Battle Command Brigade and Below/Blue Force Tracking (FBCB2/BFT)

GBU-38/B Joint Direct Attack Munition (MK-82 JDAM)

Global Combat Support System - Marine Corps/ Logistics Chain Management (GCSS-MC/LCM)

Global Command and Control System-Army (GCCS-A)

Global Command and Control System-Joint (GCCS-J) Block IV Annex

Guided Multiple Launch Rocket System Unitary (GMLRS-U)

Joint Biological Agent Identification and Diagnostic System (JBAIDS)

Joint Biological Standoff Detection System (JBSDS)

Joint Common Missile (JCM)

Joint Mission Planning System - Maritime (JMPS-M)

Joint Service Light Nuclear, Biological, and Chemical System (JSLNBCRS)

Joint Standoff Weapon (JSOW) and Joint Air-to-Surface Standoff Missile (JASSM) Integration on the B1

KC-130J Hercules Aircraft

TEST AND EVALUATION MASTER PLANS APPROVED (Continued)

Land Warrior

MH-60R Multi-mission Helicopter

Mission Planning System (MPS)

MK48 ADCAP Mod 7

National Airspace System

Navy Enterprise Resource Planning (ERP)

Net-Centric Enterprise Services (NCES)

Patriot/MEADS Number 1 for Blocks 2004 and 2006

Patriot/Medium Extended Air Defense System (MEADS) Combined Aggregate Program (CAP)

Ship Self Defense System (SSDS)

Standard Missile - 6 (SM-6)

Stryker Family of Vehicles

Tomahawk Command and Control System

UH-60M Black Hawk

V-22

Virginia (SSN 774) Class Submarine

OPERATIONAL TEST PLANS APPROVED

AIM-120 Advanced Medium Range Air-to-Air Missile (AMRAAM)

AN/SPY-1D(V) (OT-IIF2)

B-1 Conventional Mission Upgrade Program Joint Standoff Weapon (JSOW) /Joint Air-to-Surface Standoff Missile (JASSM)

Ballistic Missile Defense System (BMDS)

CH-47F

Combat Survivor Evader Locator (CSEL)

Cooperative Engagement Capability (CEC)

DD(X) Multi-mission Destroyer

DDG 51 Flt IIA Glass Guided Missile Destroyer (OT-11G)

Defense Finance and Accounting Service (DFAS) Corporate Database and Warehouse (DCD/DCW)

Defense Travel System

DoD Training Transformation

Dry Cargo/Ammunition Ship (T-AKE) (OT-IIB)

EA-6B Improved Capabilities III (ICAP III)

F/A-18E/F AESA Phase III Radar Upgrade

F/A-18E/F (OT-IIIC System Configuration Set H2E)

F-16 Block 30 MK-82 Joint Direct Attack Munition (JDAM)

Force XXI Battle Command Brigade and Below (FBCB2)

GBU-38/B Joint Direct Attack Munition (MK-82 JDAM)

GBU-39/B Small Diameter Bomb (SDB)

H-1 Upgrades (OT-IIB)

Joint Air-to-Surface Standoff Missile (JASSM)

Joint Biological Agent Identification and Diagnostic System (JBAIDS)

Joint Biological Point Detection System (JBPDS)

Joint Standoff Weapon Baseline (JSOW-A) (OT-III OPEVAL)

Joint Standoff Weapon Unitary (JSOW-C) (OT-IIB OPEVAL)

KC-130J (OT-IIIC (I))

KC-130J Hercules Aircraft

Large Aircraft Infrared Countermeasures (LAIRCM)

Line-of-Sight Anti-Tank (LOSAT)

OPERATIONAL TEST PLANS APPROVED (Continued)

Maritime Prepositioning Force (Future) (MPF(F))

MH-60R Multi-Mission Helicopter (OT-IIA)

MK-82 Joint Direct Attack Munition (JDAM)

Mobile User Objective System (MOUS)

Mortar Carrier-B (MC-B)

MV-22 Osprey (OT-IIF)

National Airspace System (NAS)

Navy Marine Corps Intranet (NMCI)

Newport Chemical Agent Disposal Facility

Ohio Class SSGN Submarine (OT-C-1)

Ship Self Defense System (SSDS) MK 2 Mod 1 (FOT&E) (OT-IIIB Phase 1)

Stryker Mobile Gun System (MGS)

Surface Electronic Warfare Improvement Program (SEWIP)

Tactical Tomahawk Weapon System (AN/SWG-5(V)) (OT-IIC)

Theater Medical Information Program (TMIP) Block 1

Tomahawk Command and Control System

UH-60M Blackhawk Helicopter

Virginia (SSN 774) Class Submarine

XM142 High Mobility Artillery Rocket System (HIMARS)

XM30 Guided Multiple-Launch Rocket System (GMLRS)

LFT&E STRATEGIES AND TEST PLANS APPROVED

Advanced SEAL Delivery System (ASDS)

AGM-154C Joint Standoff Weapon OT/LFT&E-1

AGM-154C Joint Standoff Weapon OT/LFT&E-2

AGM-154C Joint Standoff Weapon OT/LFT&E-4 and -5

AGM-154C Joint Standoff Weapon OT/LFT&E-6

AGM-154C Joint Standoff Weapon OT/LFT&E-7

AGM-154C Joint Standoff Weapon OT/LFT&E-8, -9, and -10

AH-64D Apache LFT&E Test Plan

E/A-18G Aircraft Alternative

Future Aircraft Carrier (CVN 21)

MDA Ground-Based Midcourse Defense LFT&E Strategy

Mortar Carrier-B (MC-B)

Multi-mission Maritime Aircraft (MMA)

OH-58D Kiowa LFT&E Test Plan

Small Diameter Bomb LFT&E Test Plan

Stryker Interim Armored Vehicle (IAV) Automatic Fire Extinguishing System (AFES)

UH-60Q/HH-60L/HH-60M LFT&E Test Plan

OT&E and LFT&E REPORTS TO CONGRESS FOR FY04

PROGRAM	REPORT TYPE	DATE
Advanced Targeting and Designating Forward-Looking Infrared (ATFLIR) System, Block I	OT&E Report	October 2003
Integrated Defensive Electronic Countermeasures (IDECM) Block 2 Onboard Jammer Upgrade	OT&E Report	December 2003
Joint Helmet Mounting Cueing System (JHMCS)	OT&E Report	January 2004
Evolved Seasparrow Missile (ESSM)	Combined OT&E / LFT&E Report	February 2004
Stryker OT/LFT Report	Combined OT&E / LFT&E Report	February 2004
KC-135J Global Air Traffic Management Block 40 Program	OT&E Report	March 2004
Joint Air-to-Surface Standoff Missile (U)	Combined OT&E / LFT&E Report	April 2004
Advanced SEAL Delivery System (SD) (U)	Combined OT&E / LFT&E Report	April 2004
AIM-9X Air-to-Air Missile	Combined OT&E / LFT&E Report	May 2004
Tactical Tomahawk Weapon System (TTWS)	Combined OT&E / LFT&E Report	July 2004
Strategic Sealift Program (SSP)	OT&E Report	July 2004
Combat Survivor Evader Locator (CSEL)	OT&E Report	August 2004
Force XXI Battle Command Brigade and Below / Blue Force Tracking (FBCB2/BFT)	OT&E Report	August 2004
Mortar Carrier-B (MC-B) Configuration of Stryker Family of Vehicles	Combined OT&E / LFT&E Report	September 2004

During FY04, DOT&E met with Service operational test agencies, program officials, private-sector organizations, and academia; monitored test activities; and provided information to the DAB committees as well as the DAB principals, the Secretary and Deputy Secretary of Defense, the Under Secretary of Defense (Acquisition, Technology and Logistics), the Service Secretaries, and Congress. Active on-site participation in, and observation of, tests and test-related activities remain the most effective tools. In addition to on-site participation and local travel within the national capital region, approximately 528 trips supported the DOT&E mission.

Security considerations preclude identifying classified programs in this report. The objective is to ensure operational effectiveness and suitability do not suffer due to extraordinary security constraints imposed on those programs.

DOT&E PROGRAM OVERSIGHT

DOT&E is responsible for approving the adequacy of plans for operational test and evaluation and for reporting the operational test results for all major defense acquisition programs to the Secretary of Defense, Under Secretary of Defense (Acquisition, Technology and Logistics), Service Secretaries, and Congress. For DOT&E oversight purposes, major defense acquisition programs were defined in the law to mean those programs meeting the criteria for reporting under section 2430, Title 10, United States Code (Selected Acquisition Reports (SARs)). The law (sec.139(a)(2)(B)) also stipulates that DOT&E may designate any other programs for the purpose of oversight, review, and reporting. With the addition of such "non-major" programs, DOT&E was responsible for oversight of a total of 273 acquisition programs during FY04.

Non-major programs are selected for DOT&E oversight after careful consideration of the relative importance of the individual program. In determining non-SAR systems for oversight, consideration is given to one or more of the following essential elements:

- Congress or OSD agencies have expressed a high level of interest in the program.
- Congress has directed that DOT&E assess or report on the program as a condition for progress or production.
- The program requires joint or multi-Service testing (the law (Sec. 139(b)(4)) requires the DOT&E to coordinate "testing conducted jointly by more than one military department or defense agency").
- The program exceeds or has the potential to exceed the dollar threshold definition of a major program according to DoD 5000.1, but does not appear on the current SAR list (e.g., highly classified systems).
- The program has a close relationship to or is a key component of a major program.
- The program is an existing system undergoing major modification.
- The program was previously a SAR program and operational testing is not yet complete.

This office is also responsible for the oversight of LFT&E programs, in accordance with 10 USC 139. DoD regulation uses the term "covered system" to include all categories of systems or programs identified in 10 USC 2366 as requiring live fire test and evaluation. In addition, systems or programs that do not have acquisition points referenced in 10 USC 2366, but otherwise meet the statutory criteria, are considered "covered systems" for the purpose of DOT&E oversight.

A covered system, for the purpose of oversight for LFT&E, has been determined by DOT&E to meet one or more of the following criteria:

- A major system, within the meaning of that term in 10 USC 2302(5), that is:
  - User-occupied and designed to provide some degree of protection to the system or its occupants in combat.
  - A conventional munitions program or missile program.
- A conventional munitions program for which more than 1,000,000 rounds are planned to be acquired.
- A modification to a covered system that is likely to affect significantly the survivability or lethality of such a system.

DOT&E was responsible for the oversight of 88 LFT&E acquisition programs during FY04.

PROGRAMS UNDER DOT&E OVERSIGHT CALENDAR YEAR 2004

(As taken from the January 2004 Official T&E Oversight List)

ARMY PROGRAMS

Abrams Tank Upgrade - ABRAMS Upgrade

Advanced Field Artillery Tactical Data System (AFATDS)

Advanced Threat Infrared Countermeasures / Common Missile Warning System (ATIRCM/CMWS)

Aerial Common Sensor (ACS)

Air and Missile Defense Planning and Control System (AMDPCS)

All Source Analysis System (ASAS)

AN/TPQ-47 Counterfire Radar

Army Theater Support Vessel (TSV)

Battle Command Sustainment Support System (BCS3)

Biometrics

Black Hawk Upgrade (UH-60M)

Bradley Fighting Vehicle System Upgrade

CH-47F – Cargo Helicopter (CH-47D helicopter upgrade program)

Comanche (RAH-66) Reconnaissance Attack Helicopter (Includes 20mm ammunition)

Distributed Common Ground System – Army (DCGS-A)

EXCALIBUR (Family of Precision, 155mm Projectiles)

Family of Medium Tactical Vehicles (FMTV)

Force XXI Battle Command Brigade & Below (FBCB2) Program

Forward Area Air Defense System Command and Control System (FAAD C2)

Future Combat System (FCS) and all associated systems, including:

- Battle Command
- Infantry Carrier Vehicle (ICV)
- Command and Control Vehicle (C2V)
- Reconnaissance and Surveillance Vehicle (R&SV)
- Mounted Combat system (MCS)
- Non-Line-of-Sight Mortar (NLOS Mortar)
- Non-Line-of-Sight Cannon (NLOS Cannon)
- FCS Medical Vehicle (MV)
- FCS Recovery Maintenance Vehicle (FRMV)
- UAV Class I (Organic Air Vehicle – Light) (UAV CL I)
- UAV Class II (Organic Air Vehicle-Medium) (UAV CL II)

FCS Continued:

- UAV Class III (Small UAV) (UAV CL III)
- UAV Class IV (Shadow) (UAV CL IV GROUND)
- UAV Class IV (Fire Scout) (UAV CL IV GROUND)
- Armed Robotic Vehicle (ARV)
- Multi-Function Utility/Logistics and Equipment Vehicle (MULE)
- Small Unmanned Ground Vehicle (SUGV)
- Unmanned Ground Sensors (UGS)
- Non-Line-of-Sight Launch System (NLOS LS) – to include Precision Attack Munition (PAM) and Loitering Attack Munition (LAM)
- Intelligent Munitions System (IMS)
- Mid-Range Munitions (MRM)

General Fund Enterprise Business System (GFEBS)

Global Combat Support System – Army (GCSS-A)

Global Command and Control System – Army (GCCS-A)

Guided Multiple Launch Rocket System (GMLRS)

Guided Multiple Launch Rocket System (GMLRS) – Unitary

High Mobility Artillery Rocket System (HIMARS)

Integrated System Control (ISYSCON V4)

JAVELIN- Advance Anti-Tank Weapon System – Medium

Joint Common Missile

Joint Land Attack Cruise Missile Defense Elevated Netted Sensors (JLENS)

Joint Tactical Radio System (JTRS) Cluster 1 (JTRS Cluster 1)

Joint Tactical Radio System (JTRS) Cluster 5 (JTRS Cluster 5)

Kiowa Warrior (OH-58D)

Land Warrior

Line-of-Sight Anti-Tank Missile (LOSAT)

Longbow Apache (AH-64D)

Longbow Hellfire Missile (Upgrades/Modifications)

Maneuver Control System (MCS) Army Tactical Command and Control System (MCS (ATCCS))

Medium Extended Air Defense System (MEADS)

ARMY PROGRAMS (continued)

Mobile Tactical High Energy Laser (MTHEL)

Patriot Advanced Capability-3

Precision Guided Mortar Munitions (PGMM)

Single Channel Anti-Jam Man-Portable (SCAMP) (MILSTAR, Block II)

Single Channel Anti-Jam Man-Portable (SCAMP) System Enhancement Program (SEP)

Stryker – Armored Vehicle

Surface-Launched AMRAAM (SLAMRAAM) Missile

Suite of Integrated Radio Frequency Countermeasures (SIRFC) (AN/ALQ-211)

Transportation Coordinator's Automated Information for Movement System II (TC-AIMS II)

Visual Information Support (VIS)

Warfighter Information Network-Tactical (WIN-T)

XM8 Lightweight Modular Weapon System

XM29 Integrated Air Burst Weapon System (formerly the OICWS)

XM307 Objective Crew Served Weapon System (OCSWS)

NAVY PROGRAMS

Acoustic Rapid COTS Insertion for SONAR

Active Electronically Scanned Array (AESA)

AGM-88E Advanced Anti-Radiation Guided Missile (AARGM) Program

Advanced Deployable System (ADS)

Advanced SEAL Delivery System (ASDS)

Affordable Weapon System

AIM-9X Air-to-Air Missile Upgrade

Airborne Mine Neutralization System (AMNS)

Air Early Warning (AEW)

AN/AAR-47 V2 Upgrade Missile / Laser Warning Receiver

AN/ALR-67 Advanced Special Receiver (ASR) V2 & V3

AN/APR-39A V2 Radar Warning Receiver

AN/SPY-1 B/D (All Versions)

AN/WSQ-11 Countermeasure Anti-Torpedo

Ballistic Missile Technical Collection (BMTC)

Broad Area Maritime Surveillance (BAMS)

CH-53X Upgrade to USMC H-53 Program

Cooperative Engagement Capability (CEC)

Cobra Judy Replacement (CJR) - Ship-based radar system

Cruiser Conversion

CVN 68 - Nimitz Class Nuclear Powered Aircraft Carriers

CVN-21- Next Generation Nuclear Attack Carrier

DDG-51 Guided Missile Destroyer (Basic ship and all variants)

DD(X) Future Surface Combatant

Defense Integrated Military Human Resources System (DIMHRS)

Deployable Joint Command and Control (DJC2)

E-2C Advanced Hawkeye (E2C Radar Modernization Program (RMP))

E-2C Reproduction Hawkeye

EA-6B Improved Capabilities (ICAP) III & Multiple Upgrades (Low Band Transmitter, Band 7-8 Transmitter, USQ-113 Communications Jammer)

E/A-18G (electronic variant of F/A-18)

Expeditionary Fighting Vehicle (EFV)

Evolved Seasparrow Missile (ESSM)

Extended Range Guided Munition (ERGM)

F-35 Joint Strike Fighter (JSF) Program

F/A-18 E/F Hornet Naval Strike Fighter (All upgrades)

Fixed Distributed System (FDS)

Global Command and Control System – Maritime (GCCS-M)

Global Combat Support System – Marine Corps (GCSS-MC)

H-1 Upgrades (4BW/4BN)

Identification Friend or Foe Mark XIIA Mode 5

NAVY PROGRAMS (continued)

Integrated Defensive Electronic Countermeasure (IDECM)

Integrated Surface Ship ASW Combat System (AN/SQQ-89)

Joint Mission Planning System (JMPS)

Joint Standoff Weapon (JSOW) Baseline/Unitary

Joint Tactical Radio System Cluster 3 (JTRS Cluster 3)

KC-130J Aircraft

Logistics Automated Information System (LOGAIS) (USMC)

Long Range Land Attack Projectile (LRLAP)

LHA(R) - New Amphibious Assault Ship

LHD 1 Amphibious Assault Ship

LHD 8 Amphibious Assault Ship

Littoral Combatant Ship (LCS)

LPD-17 Amphibious Transport Dock (Includes 30mm ammunition)

MH-60R Multi-Mission Helicopter Upgrade

MH-60S Helicopter (Utility helicopter replacing existing CH-46D, HH-60H, SH-3 & UH-1N helicopters)

Multi-Functional Information Distribution System - Low Volume Terminal (MIDS-LVT)

MK-48 Torpedo Mods

Multi-Mission Maritime Aircraft (MMA)

Maritime Prepositioning Force (Future) (MPF (F))

Naval Integrated Fire Control-Counter Air (NIFC-CA)

Navy Advanced EHF Multi-Band Terminal (NMT)

Navy Enterprise Resource Planning (ERP) (includes Navy Enterprise Maintenance Automated Information System (NEMAIS)

Navy-Marine Corps Intranet (NMCI)

Navy Standard Integrated Personnel System (NSIPS)

Rapid Airborne Mine Clearance System (RAMICS)

Rolling Airframe Missile (RAM)

Ship Self Defense System (SSDS)

Surface Electronic Warfare Improvement Program (SEWIP)

SSGN *Ohio* Class Conversion

SSN-21 *Seawolf* AN/BSY-2

SSN-23 *Jimmy Carter*

SSN-774 *Virginia* Class Submarine

Standard Surface-to-Air Missile 6 (SM-6)

Standard Missile-2 (SM-2) (Blocks I/II/III/IV)

Standoff Land Attack Missile - Expanded Response (SLAM-ER)

Strategic Sealift Program (SSP) Ship Class

Submarine Exterior Communications System (SubECs) (Includes Common Submarine Radio Room (CSRR))

Surveillance Towed Array Sensor System (SURTASS) / Low Frequency Active (LFA)

T-AKE Lewis & Clark Class Of Auxiliary Dry Cargo Ships

T-AOE(X) (Fast Combatant Support Ship)

T-45TS (Undergraduate Jet Pilot Training System)

Tactical Control System (TCS)

Tactical Tomahawk Missile

Tactical Tomahawk Mission Planning System / Tomahawk Command & Control System (MPS/TCCS)

Trident II Missile

V-22 Osprey Joint Advanced Vertical Lift Aircraft

Vertical Take-Off Unmanned Aerial Vehicle (VTUAV)

VXX (VH-3D) Presidential Helicopter Fleet Replacement Program

AIR FORCE PROGRAMS

Advance EHF (AEHF)

ALR-56M Radar Warning Receiver

ALR-69 Radar Warning Receiver

Advanced Medium Range Air-to-Air Missile (AMRAAM)

Advanced Polar System (APS)

Airborne Warning and Control System (AWACS (E-3)) Upgrades (Includes AWACS RSIP (E-3))

Air Operations Center - Weapons System (AOC-WS)

B-1B CMUP – B-1 LANCER Penetrating Bomber Conventional Mission Upgrade Program (CMUP)

B-2 Radar Modernization Program (B-2 RMP)

B-2A Spirit Stealth Bomber

B-52 Re-Engining Program

C-5 Avionics Modernization Program (AMP)

C-5 Reliability Enhancement and Re-engining Program (RERP)

C-17A - Globemaster III Advanced Cargo Aircraft

C-130 AMP - Avionics Modernization Program

C-130J Hercules Cargo Aircraft (All Variants)

Combat Information Transport System (CITS)

Combatant Commander's Integrated Command and Control System (CCIC2S)

Combat Survivor Evader Locator (CSEL)

Defense Enterprise Accounting Management System (DEAMS)

Deliberate and Crisis Action Planning and Execution Segments (DCAPES)

Distributed Common Ground System-Air Force (DCGS-AF) (including Blk10)

E-4B Modernization Program

E-10 – Multi-Sensor Command and Control Aircraft (MC2A) Program

Evolved Expendable Launch Vehicle (EELV)

Family of Beyond Line-of-Sight Terminals (FAB-T)

F-117 Infra-Red Acquisition and Designation System (IRADS)

F-15 Tactical Electronic Warfare Suite (TEWS) (AN/ALQ-135 Band 1.5 Fiber-Optic Towed Decoy)

F/A-22 – Advanced Tactical Fighter

Financial System Initiative (FSI)

Global Broadcast Service (GBS)

Global Combat Support System - Air Force (GCSS-AF)

Global Command and Control System - Air Force (GCCS-AF)

Global Hawk High Altitude Endurance Unmanned Aerial Vehicle

Global Positioning System III (GPS III)

Global Transportation Network-21 (GTN-21)

Integrated Strategic Planning and Analysis Network (ISPAN)

Joint Air-to-Surface Standoff Missile (JASSM) and JASSM Expanded Response (ER)

Joint Direct Attack Munition (JDAM)

Joint Helmet Mounted Cueing System (JHMCS)

Joint Mission Planning System (JMPS)

Joint Precision Approach and Landing System (JPALS)

Joint Primary Aircraft Training System (JPATS)

Joint Surveillance Target Attack Radar System (JSTARS)

Joint Tactical Radio System Cluster 4 (JTRS Cluster 4)

KC-767A Aerial Tanker Aircraft

KC-135 Global Air Traffic Management (GATM) Upgrade

KC-135 Recapitalization Program

Large Aircraft Infrared Countermeasures (LAIRCM)

Minimum Essential Emergency Communications Network (MEECN)

MILSTAR (Satellite Low/Med Data Rate Communications)

Minuteman III GRP - Guidance Replacement Program

Minuteman III PRP - Propulsion Replacement Program

Mission Planning System (MPS)

Multiple Platform – Common Data Link (MP-CDL)

Multi-Platform Radar Technology Insertion Program (MP-RTIP)

Mobile User Objective System (MUOS)

AIR FORCE PROGRAMS (continued)

National Airspace System (NAS)

National Polar-Orbiting Operational Environment Satellite (NPOESS)

NAVSTAR Global Positioning System (GPS)

Navy Extremely High Frequency (NESP) Satellite Communications (SATCOM) Program

Personnel Recovery Vehicle (PRV)

Predator Unmanned Aerial Vehicle (UAV) RQ/MQ-1

Predator B Armed Unmanned Aerial Vehicle (UAV) MQ 9

Space-Based Infrared System Program, High Component (SBIRS-HIGH)

Space Based Radar (SBR)

Sensor Fuzed Weapon (SFW) P3I (CBU-97/B)

Small Diameter Bomb (SDB)

Secure Mobile Anti-Jam Reliable Tactical Terminal (SMART-T)

Tactical Air Control System (TACS)

Theater Battle Management Core System (TBMCS)

Theater Deployable Communications (TDC)

Transformational SATCOM System (TSAT)

Wideband Gapfiller

OTHER DoD PROGRAMS

Ballistic Missile Defense Program
- Ground Based Midcourse Defense Segment (Includes Ground Based Interceptor [GBI], Ground Based Radar [GBR], and Battle Management C3 [BMC3])
- AEGIS BMD and SM-3 BLOCK I
- Space Tracking and Surveillance System (STSS)
- Theater High-Altitude Area Defense (THAAD)
- YAL-1 Airborne Laser (ABL)

Business System Modernization (BSM)

Chemical Agent Standoff Detection System (Artemis)

Joint Biological Agent Identification and Diagnosis System (JBAIDS)

Joint Biological Point Detection System (JBPDS)

Joint Biological Stand Off Detection System (JBSDS)

Joint Chemical Agent Detector (JCAD)

Joint Service Light NBC Reconnaissance System (JSLNBCRS)

Joint Service Lightweight Standoff Chemical Agent Detector (JSLSCAD)

Joint Service Sensitive Equipment Decontamination (JSSED)

Joint Warning and Reporting Network (JWARN)

Cryptologic Mission Management (CMM)

Consolidated Advanced Resale Transaction System (CARTS)

Chemical Demilitarization

Composite Health Care System II (CHCS II)

Defense Message System (DMS)

Defense Travel System (DTS)

DFAS Corporate Database/Warehouse (DCD/DCW)

Geoscout Block 1

Global Information Grid-Bandwidth Expansion (GIG-BE))

Global Command & Control System – Joint (GCCS-J)

Global Combat Support System COCOM/JTF (GCSS-(CC/JTF))

Global Electromagnetic Spectrum Analysis System (GEMSAS)

High Performance Computing Modernization (HPCM)

Joint Tactical Radio System Waveform (JTRS WAVEFORM)

Joint Unmanned Combat Air System (JOINT UCAS) (Includes AF and Navy UAV programs)

Journeyman

Net- Centric Enterprise Services (NCES)

Key Management Infrastructure (KMI)

Public Key Infrastructure (PKI)

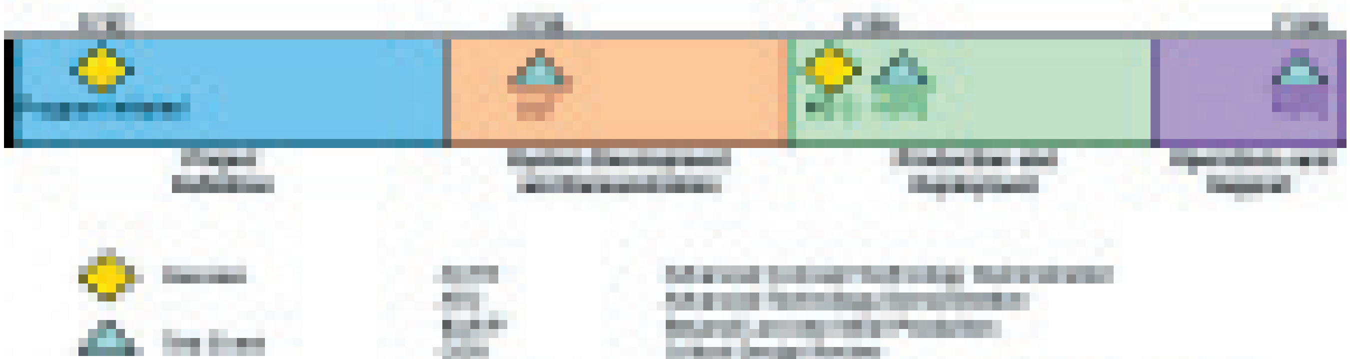
Rebuilding Analysis (REBA)

Teleport

Theater Medical Information Program (TMIP)

Trailblazer (TBMMP)

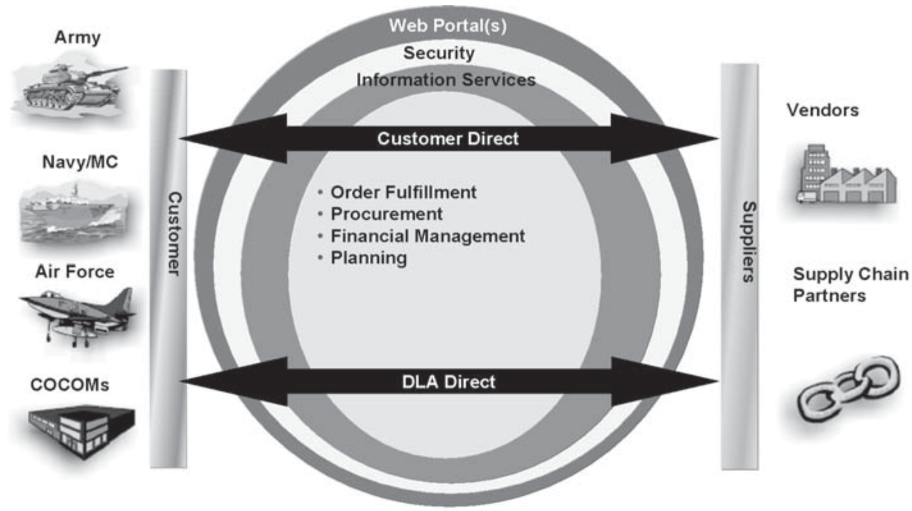
Timeline Key



Business Systems Modernization (BSM)

SUMMARY

- Operational assessment results revealed that the Business Systems Modernization (BSM) successfully performed approximately 90 percent of its functional requirements.
- Order fulfillment successfully reduced processing time from 12 hours to 1 hour (on average) through the introduction of Releases 1.0 and 1.1.
- The operational assessments have greatly benefited BSM development.
- IOT&E for BSM is planned for 1QFY05.



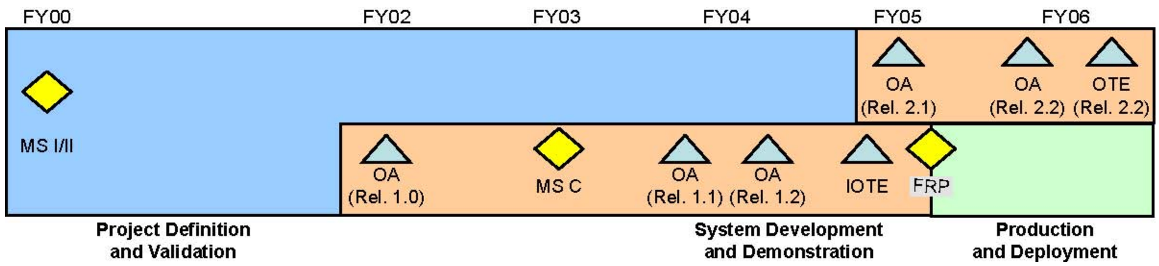
The BSM program provides the capability for the Defense Logistics Agency to manage to specific outcomes, allow optimization within given levels of resources, and provide focused support on product and operating-cost reduction.

SYSTEM DESCRIPTION AND MISSION

The BSM program provides the capability for the Defense Logistics Agency (DLA) to manage to specific outcomes, allow optimization within given levels of resources, and provide focused support on product and operating-cost reduction. These objectives represent DLA's approach to meeting the requirements of the DoD Future Logistics Enterprise and the DLA Strategic Plan. The BSM strategy's first focus is to replace DLA's primary legacy supply chain management/materiel management systems – The Standard Automated Materiel Management System and the Defense Integrated Subsistence Management System – with an expanded enterprise computing environment and commercial off-the-shelf software packages that include Enterprise Resource Planning and Advanced Planning Systems. The BSM strategy, over the course of several years, will result in a new agency-wide information technology architecture that will enable the DLA to continuously reengineer its logistics processes to reflect the best business practices.

In July 2002, DLA initiated the concept demonstration of BSM Release 1.0, which represented approximately 80 percent of the planned functionality, with a limited number of commodities (5 percent) and a small number of end-users at the Defense Supply Centers. Release 1.0 essentially replaced the functionality of the legacy Standard Automated Materiel Management System. Based on the experience obtained in the development and implementation of this first release, DLA revised the BSM implementation strategy and schedule for the remaining functionality. The next phase is the implementation of Release 1.1, which incorporates the functionality related to the management of battle dress uniforms (BDUs) and subsistence. DLA introduced BDU and subsistence management functionality as part of a phased rollout in May 2004. After successful demonstration and operational assessment of Release 1.1, Release 2.0 will integrate additional functionality before the Initial Operational Test and Evaluation (IOT&E) of BSM. DLA forecasts a full deployment decision review for Release 2.0 in early 2005. Current plans indicate a Full Operational Capability achieved in September 2006.

TEST AND EVALUATION ACTIVITY



The Joint Interoperability Test Command (JITC) conducted an operational assessment on selected functionality of Release 1.0 in 1QFY02 to assess system maturity. JITC conducted an operational assessment for Release 1.1 in 2QFY04 and Release 1.2 in 4QFY04. The JITC plans to conduct IOT&E for BSM Release 2.0 in 1QFY05.

TEST AND EVALUATION ASSESSMENT

The operational assessment results revealed that BSM successfully performed approximately 90 percent of its functional requirements. Of the four primary BSM functional areas, Order Fulfillment continues to achieve the most favorable results. Users in this area experienced little or no operational difficulties. Material Release Order processing time from requisition receipt has dropped from 12 hours before BSM to under 1 hour. In general, the Planning and Financial Management functionality performed effectively. However, some Demand Planning users experienced difficulties completing demand analysis and forecasting actions.

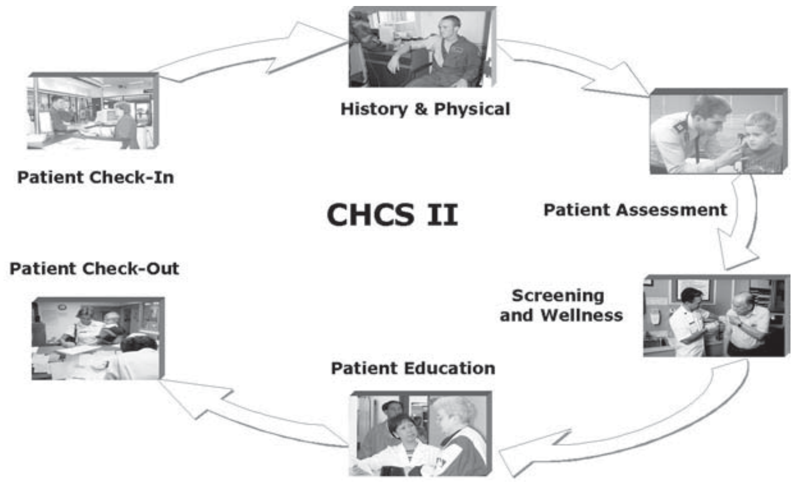
The Procurement functionality was the least favorable overall. The operational assessments have benefited BSM development. The feedback has assisted in highlighting important areas for improvement. They include development of more effective Information Assurance criteria, improving BSM training, improving the training and preparedness of the JITC team, and the need to closely review the threshold measures of performance in the Interoperability of critical interfaces.

We will complete a full assessment of the BSM performance after the IOT&E.

Composite Health Care System II (CHCS II)

SUMMARY

- The Composite Health Care System II (CHCS II) Block 1 exhibited some performance and reliability problems during 2004 that now appear to be corrected. There are also productivity (patient throughput) concerns that may be offset by other major medical care benefits.
- In July 2004, the Army Test and Evaluation Command and the Army Medical Department Board began operational test and evaluation of Block 2 at seven sites in Virginia and Texas.
- Block 2 met its functional requirements. However, qualitative data obtained from user questionnaires indicate that the dental module is not user friendly enough. Users also related that the same productivity concerns arise with dental encounters as with medical encounters.
- The operational testers need suitable metrics to determine whether more experience with CHCS II alleviates the apparent productivity loss and whether the long-term benefits of CHCS II will outweigh its near-term disruptions.



CHCS II provides a uniform, comprehensive, legible, secure, computer-based patient record for every beneficiary of the Military Health System.

SYSTEM DESCRIPTION AND MISSION

CHCS II provides a uniform, comprehensive, legible, secure, computer-based patient record for every beneficiary of the Military Health System. All military treatment facilities worldwide will use it—fixed, deployed, and aboard ships. Building on the existing CHCS, CHCS II integrates medical and dental information. It is a key enabler for force health protection and population health improvement. It also provides health care information on deployed Service members. The program manager is implementing CHCS II in blocks of increasing functionality.

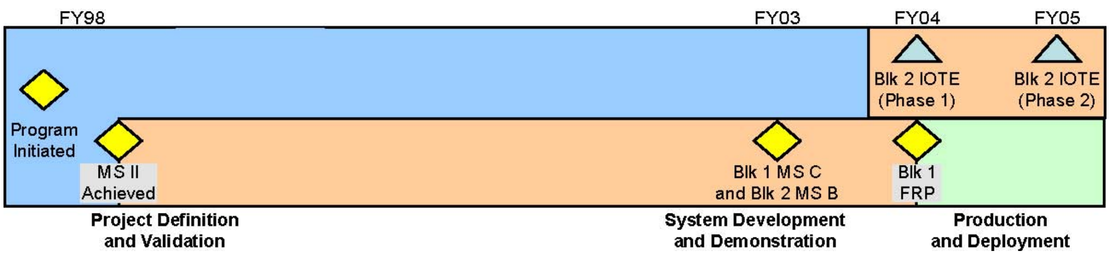
CHCS II is on the leading edge of technology. It must link multiple commercial off-the-shelf products. It introduces new techniques and procedures to record patient encounters. This includes the use of templates to standardize the computer-based patient record. CHCS II will have a tremendous operational impact on the fighting force. The new patient record will be the first (military or civilian) cradle-to-grave automated health care record.

The Army Test and Evaluation Command is the lead operational test agency. In the 2002 initial operational test and evaluation (IOT&E), Army testers found that Block 1 was operationally effective, operationally suitable, and survivable. We determined that the IOT&E was adequate and generally agreed with the test findings. However, we also determined that an additional mission performance parameter applied. This factor was not in the approved Operational Requirements Document. Health care professionals at every test site reported that the number of patient encounters (i.e., office visits) completed is a major measure of mission performance. They indicated that a patient encounter usually takes longer using CHCS II than it would if documented solely on paper. This was particularly the case in general clinics such as family practice and primary care. The providers were unable to meet a goal of seeing up to 25 patients per day.

But CHCS II may save time in other ways and offers major benefits. These include a legible, accurate, and electronically transferable computer-based patient record. The President and the Congress mandated this requirement in Presidential

Review Directive 5 and Public Law 105-85, respectively. We could not establish whether the acknowledged benefits, and the fact that CHCS II fully met its documented requirements, outweigh the need to maximize patient encounters. During FY03, Army testers tried to resolve the productivity issue. They used data provided by Bearing Point, Inc. The testers found that the number of patient encounters initially dropped off by about 20 percent across the Services after the installation of CHCS II. As the use of CHCS II Block 1 increased, productivity did not further decrease. But the data collection period was short. The metrics were questionable. The ramifications of the findings were not clear to us or to the user community. The Milestone Decision Authority therefore directed the program manager to work with the Services and with us to determine appropriate metrics to quantify productivity. This activity continues.

TEST AND EVALUATION ACTIVITY



The program office fielded CHCS II Block 1 to all three Services at about 20 locations. Meanwhile, they developed CHCS II Block 2, which provides dental and optometry capabilities. The program office installed this version for developmental testing at the dental and optometry clinics at Sheppard Air Force Base, Texas; Fort Eustis, Virginia; and the Naval Base in Norfolk, Virginia. In June 2004, we approved an updated Test and Evaluation Master Plan and a detailed Operational Test and Evaluation Plan for Block 2. In September 2004, we revalidated the Test and Evaluation Master Plan.

While the program office was testing Block 2, they continued to field Block 1. As the number of sites increased, many users began to encounter serious problems. System performance was poor. Some functions ceased to work properly. This potentially affected the performance of Block 2. (Block 2 rides on the same infrastructure as Block 1. It uses the same computer-based patient record.) As the scheduled time for IOT&E of Block 2 approached, we decided that it would be appropriate to conduct it in two phases. The program office, the operational test agency, and the user community agreed with us. The unresolved Block 1 problems would preclude an immediate fielding of Block 2, regardless of the test results.

In July 2004, the operational testers began Phase I Operational Test and Evaluation of Block 2. They tested it at the seven sites in Virginia and Texas previously used for developmental testing. If the program office is able to correct the Block 1 discrepancies by November 2004, the Army testers will verify the status and complete Phase II IOT&E by the end of 2004. The program office reportedly has made great progress. During the Phase II IOT&E, the testers will consider all usable data collected during Phase I.

TEST AND EVALUATION ASSESSMENT

Phase I IOT&E provided important insight into the operational effectiveness and operational suitability of Block 2. Quantitative data indicate that CHCS II Block 2 is performing the dental functions as designed. These data also indicate that there are no significant concerns with the optometry portion. However, qualitative data obtained from user questionnaires indicate that the dental module is not user friendly enough. This data also indicates that the same productivity concerns arise with dental encounters in Block 2 as with medical encounters in Block 1. Dentists and dental technicians stated that they were unable to treat as many patients using CHCS II as they could by recording information on paper. The testers need to be able to determine whether more experience with CHCS II eventually alleviates the problem. They need to be able to judge whether the long-term benefits outweigh any apparent productivity loss.

To assist in answering these questions, the Army Test and Evaluation Command has updated the user survey to record participant responses during the second phase of the Block 2 evaluation, targeting these specific areas of concern. Since the review of Phase 1 results, substantial efforts have been made to improve the system. The revised survey is intended to capture how those Human System Integration and system performance changes have impacted user friendliness, productivity, and mission support. The Phase II testing is on track to commence as scheduled in November 2004.

Cryptologic Mission Management (CMM)

OSD added CMM to its test and evaluation oversight list in January 2004.

SUMMARY

- Cryptologic Mission Management (CMM) is a new oversight program intended to manage signals intelligence.
- The CMM Test and Evaluation Master Plan (TEMP) is ready for submission to OSD for approval.

SYSTEM DESCRIPTION AND MISSION

CMM is a new program under development by the National Security Agency (NSA). CMM will manage the signals intelligence resources that comprise the Unified Cryptologic System in response to requirements from the intelligence community. CMM will:

- Enable customers to view the status of their information requests.
- Support dynamic mission allocation.
- Provide metrics on asset utilization and performance.

The nine Unified Cryptologic System partners are:

- National Security Agency
- Central Intelligence Agency
- Defense Intelligence Agency
- National Reconnaissance Office
- Service cryptologic elements – Army, Air Force, Navy, Marine Corps, and Coast Guard.

The National Defense Authorization Act for FY04 designated that the Under Secretary of Defense for Acquisition, Technology, and Logistics assume the responsibility of milestone decision authority for major NSA modernization programs, including CMM, for a period of at least two years.

NSA has formed the NSA Operational Test Authority (OTA) to manage the operational test and evaluation for NSA acquisition programs. The NSA OTA has designated the Joint Interoperability Test Command as the operational test agency for all NSA operational test and evaluation. OSD added CMM to its test and evaluation oversight list in January 2004, following its designation as a pre-Major Defense Acquisition Program/Major Automated Information System program in December 2003.

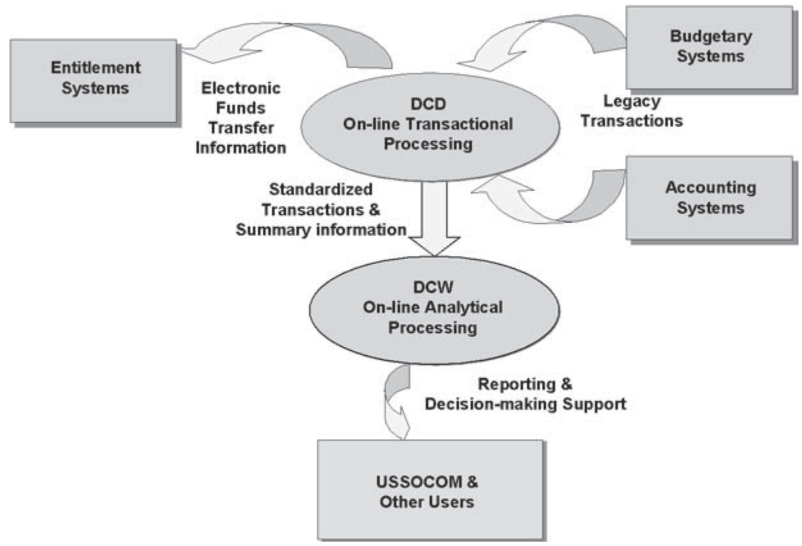
TEST AND EVALUATION ACTIVITY

The CMM Program Management Office convened several Integrated Product Teams and completed a coordination draft of the CMM TEMP.

TEST AND EVALUATION ASSESSMENT

The CMM TEMP is ready for submission to OSD for approval. However, restructuring of other systems in the NSA modernization program may delay CMM TEMP submission. Based on the dependency between CMM and the other systems in the NSA modernization program, the CMM OT&E environment must include the functionality and representative loads of all other systems in the NSA modernization program.

Defense Finance and Accounting Service (DFAS) Corporate Database/Warehouse (DCD/DCW)



DCD/DCW provides a central data source and an interoperability mechanism to standardize and share DoD financial information.

SUMMARY

- The Joint Interoperability Test Command conducted Initial Operational Test and Evaluation (IOT&E) on live systems during 3QFY04. Testing took place at seven test sites in typical operational environments.
- Defense Finance and Accounting Service (DFAS) Corporate Database and Corporate Warehouse (DCD/DCW) is not operationally effective, but it is operationally suitable. It is not able to provide accurate financial management information below the summary level.
- Most legacy financial systems are not compliant with current standards for handling financial transactions. They pass inaccurate data to DCD/DCW. This precludes many users from effectively using the system.
- The United States Special Operations Command prototype sites represent the bulk of the hardware investment. The software is already developed. The decision on whether to field DCD/DCW to other activities will need to consider the operating costs. It must weigh the costs against the potential benefits of a system with only partially accurate information.

SYSTEM DESCRIPTION AND MISSION

DFAS is trying to improve financial accountability for DoD agencies and components. Capitalization of the assets of these organizations resulted in over 300 separate information systems placed under the DFAS control. These stovepipe systems are not interoperable. This makes data sharing across systems and functions cumbersome and unreliable. DCD/DCW provides a central data source and an interoperability mechanism to standardize and share DoD financial information. It is not a “system” in the traditional sense. Rather, it is an “enabling” service that provides a corporate core component of the enterprise. As such, DCD/DCW must comply with certain requirements. The DoD Global Information Grid and the Global Combat Support System Capstone Requirements Documents comprise some of these requirements. DCD/DCW also must evolve to support objectives articulated by the Deputy Secretary of Defense. These objectives are contained in Global Information Grid Enterprise Services: Core Enterprise Services Implementation, November 5, 2003.

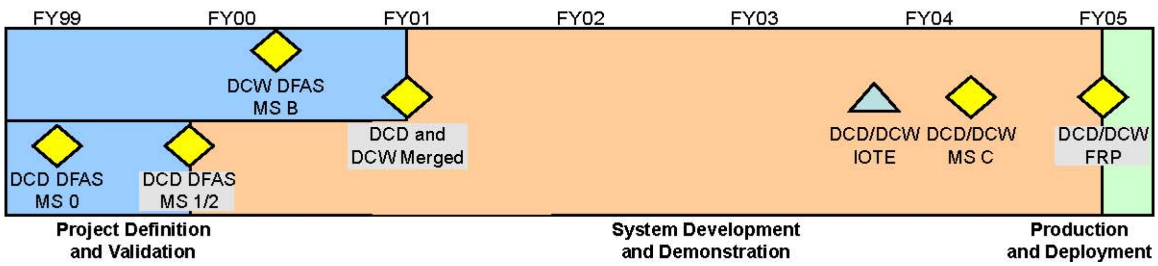
Organizations responsible for financial accountability and reporting need to capture electronic data to a standardized, shared database environment on a daily basis. They need a system that will track and retain transaction identification, formats, and selection criteria. It must accept, edit, and process transactions in various formats.

The DCD provides this capability with On-Line Transactional Processing. It supports achievement of DFAS process improvement goals by minimizing system-to-system interfaces. Most importantly, it improves operational performance by providing near real-time data access to the users. DFAS also requires a static data source, or warehouse, as an adjunct to the DCD. The data source has to support reporting, audit, and analysis.

The DCW provides an On-Line Analytical Processing capability that supports these reporting and decision-making activities. In addition, DCW contains information beyond accounting and finance products and services. It includes performance measurement indicators, budget formulation, and managerial accounting data.

Both the database and data warehouse are built as non-application-specific repositories of detail-level financial data. Summarization, aggregation, analysis, and reporting are functions that specific organizations must perform. They do it through in-house queries and On-Line Analytical Processing tools. These tools access non-application-specific detail-level data in the warehouse through distinct data marts specifically tailored to a financial organization's needs.

TEST AND EVALUATION ACTIVITY



We approved the Test and Evaluation Master Plan in April 2004. We also approved the detailed IOT&E plan in April 2004. The Joint Interoperability Test Command conducted the IOT&E in April and May 2004 at seven test sites. These included Special Operations Command headquarters and elements at MacDill Air Force Base, Florida; Fort Bragg, North Carolina; and Hurlburt Field, Florida. The locations also included DFAS centers in Columbus, Ohio, and Omaha, Nebraska. The testers adequately planned and executed the IOT&E. They submitted a test report in June 2004. The Milestone Decision Authority will make a deployment decision in November 2004.

TEST AND EVALUATION ASSESSMENT

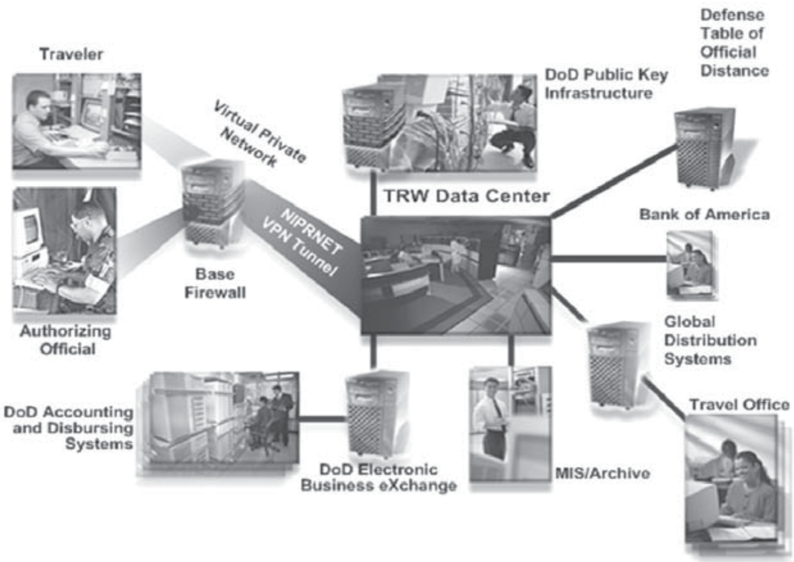
DCD/DCW is not operationally effective, but it is operationally suitable. Its core functionality includes Corporate Electronic Funds Transfer processes and cross-Services Financial Information Support. The former process provides a centralized database for funds transfer and payment information. The latter provides consolidated cross-Services accounting transactions. These are supposed to provide accurate near real-time financial management information. However, the Financial Information Support process could not provide accurate financial management information below the summary level. (This is the level of DoD reporting to Congress.) Users who need lower-level (program level) information could not use the system to accomplish their missions. The Joint Interoperability Test Command did not recommend certification of any of the external interfaces related to Financial Information Support.

Inaccurate or non-standard transactions originated from the Services' accounting and financial systems were the primary cause of the data inaccuracies. DCD/DCW treats some inaccurate source data from these systems as accurate until correcting it in a reconciliation process. Reconciliation does not happen until at least 25 working days after the end of a reporting period. Meanwhile, high-level – and many of the low-level – reports do not reflect accounting values within an accuracy requirement of 95 percent. DCD/DCW cannot correct this inaccurate source data any earlier in an automated fashion. The Services would have to replace their current systems with systems compliant with the standards for internal controls.

DFAS and the Special Operations Command reportedly are satisfied with the DCD/DCW capabilities. They have memorandums of agreement on how to perform the reconciliation process. They also agree on how to maximize the utility and functionality of DCD/DCW in the interim. Once the results of a report or query are displayed on a user's screen, the user can "drill-down" to lower levels of detail. Users can also "drill-through" to the DCW and view legacy transactions that are the data source for the report or query results. The computing hardware used by the Special Operations Command prototype sites represents the bulk of the hardware investment. The software is already developed. The decision on whether to field to other activities must consider the operating costs. It must weigh them against the potential benefits of a system with only partially accurate information.

Defense Travel System (DTS)

SUMMARY



DTS is a seamless, paperless, automated information system for supporting travel requirements.

- The Office of the Secretary of Defense approved the Enhanced Jefferson version of the Defense Travel System (DTS) for Production and Deployment in October 2003. We consider the Enhanced Jefferson version of DTS effective, suitable, and survivable.
- Subsequently, we approved a risk assessment that recommended a full operational test and evaluation (OT&E) of the core functions of the most recent software version, called Madison.
- We approved an updated Test and Evaluation Master Plan to support testing of Madison. We also approved a detailed Event Design Plan to support the OT&E of Madison core functions.
- The Army Test and Evaluation Command completed a successful system assessment of Madison's Deployment Tools functionality. The program director began fielding this minor enhancement while incorporating several recommended improvements.

SYSTEM DESCRIPTION AND MISSION

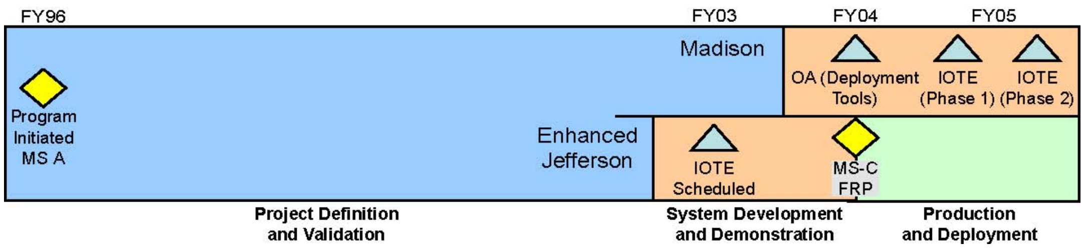
DTS is a seamless, paperless, automated information system for supporting travel requirements. It also reduces cost. DTS integrates commercial travel reservation systems and DoD accounting and disbursing systems via a virtual, private network to provide travelers with an end-to-end travel process. The program director is developing DTS as an evolutionary acquisition, using a spiral development strategy. This strategy fields the system in increments of increasing functionality. There are two blocks of development. The initial focus is on Temporary Duty travel (Block 1). The names of the releases match early U.S. Presidents. After Block 1, the focus will shift to Permanent Change of Station travel (Block 2).

The travel process begins with the users accessing the DTS via a web portal. There they create and digitally sign travel requests based on real-time transportation, lodging, and rental car availability. DTS interfaces with various commercial reservation systems. The user-generated travel authorization contains a "should cost" estimate of the trip. DTS enforces compliance with DoD travel policies based on simplified entitlements using audit alerts. Next, DTS routes the authorizations to Authorizing Officials for approval. After concluding travel, the user prepares an on-line voucher. DTS validates it through appropriate financial systems that generate reimbursement.

OSD assumed acquisition oversight in May 2002. At that time, the Adams release was already in use, or soon to be installed, at 20 pilot sites. It used a client-server architecture. During 2002 and 2003, the program director developed a new, primarily web-based version. It became known as Enhanced Jefferson. The Army Test and Evaluation Command completed the IOT&E on this version in two phases that culminated with an in-field operational assessment in August 2003. The Army testers reported that the Enhanced Jefferson version was operationally effective, operationally suitable, and survivable. However, some features (such as group travel) still required time-consuming workarounds. In addition, the system needed to be more intuitive to the user and training needed improvement. We also noted that DTS changes

several business processes. Its success often depends on vigorous implementation and full support from the using commands and activities.

TEST AND EVALUATION ACTIVITY



We concurred with an Army risk assessment of Madison that recommended a full OT&E of its core functions. Significantly less operational testing will be required for some minor functions.

In July 2004, Army testers and the program director updated the 2003 Test and Evaluation Master Plan to support the Madison version. We approved both the original plan and the update. In September 2004, we approved a detailed Event Design Plan to support the OT&E of Madison core functions.

Developmental test and evaluation of four sub-releases of Madison proceeded during 2004. Two of the low risk sub-releases, Deployment Tools and Centrally Billed Accounts 2.0, entered a period of operational assessment. In July 2004, the Army Test and Evaluation Command completed a successful system assessment of Deployment Tools. The program director began fielding this minor enhancement while incorporating several improvements that the Army and we recommended.

TEST AND EVALUATION ASSESSMENT

OSD approved DTS entry into Production and Deployment in October 2003. The system achieved Initial Operational Capability in December 2003. By the end of FY04, the program director had corrected many of the problems found during IOT&E. By then, Enhanced Jefferson was fielded to nearly 3,000 sites. They comprised about 400,000 of 3.2 million expected users.

The program director is well along in developing Madison, the next major release. It corrects remaining Enhanced Jefferson deficiencies while also providing new capabilities.

The Deployment Tools functionality that the Army assessed during FY04 is a minor enhancement. It provides authorized Defense travel administrators with a tool to enter site data directly into DTS with no or little assistance required from technicians. It also allows travelers to create their own profile prior to creating travel documents, which reduces the travel administrators' workload. The Army found this enhancement to be operationally effective with some limitations and survivable at all sites. Army testers noted that the tools were suitable at Phase II sites and suitable with limitations at Phase III sites. (The Phase III sites are generally much smaller than the Phase II sites, and less capable of self-support.) The Army Test and Evaluation Command provided several recommendations to the program director. These included functionality enhancements, better training and support, and usability improvements. We concurred with the Army's assessment and recommendations. The program director moved quickly to incorporate the fixes or schedule them for near term upgrades.

The Army testers will conduct OT&E of the core capabilities of Madison in two phases, as each sub-release completes development. Using an in-lab approach, they will test the first available set of major capabilities during 1QFY05. They will test the second set during 3QFY05. They will then conduct an in-field operational assessment during 3QFY05 to ensure that Madison is operationally effective, suitable, and survivable in the field environment. This approach is consistent with the methodology that we approved for Enhanced Jefferson. It is necessary because OT&E of a web-based system like DTS presents special challenges. While operational testers can test DTS in the laboratory, the program director must field it in order for testing to occur in the actual users' web-based environment. It must completely replace the previous release because Defense Accounting and Disbursing Systems can only interface with one version of DTS at a time.

Global Command and Control System (GCCS) - Joint

SUMMARY

GCCS-J provides seamless battlespace awareness and a fused battlespace picture by exchanging data, imagery, intelligence, status of forces, and planning information.

- The Global Command and Control System - Joint (GCCS-J) conducted an Initial Operational Test and Evaluation (IOT&E) in January 2004 and a retest in June 2004. The test focused on two major subsystems:
  - Joint Operational Planning and Execution System (JOPES).
  - Status of Resources and Training System (SORTS).
- JOPES testing revealed shortcomings in database synchronization, overall system performance, and interoperability. The new JOPES system will not be fielded in its present state.
- SORTS testing showed this portion of GCCS-J is effective and suitable, and will be fielded as soon as possible.

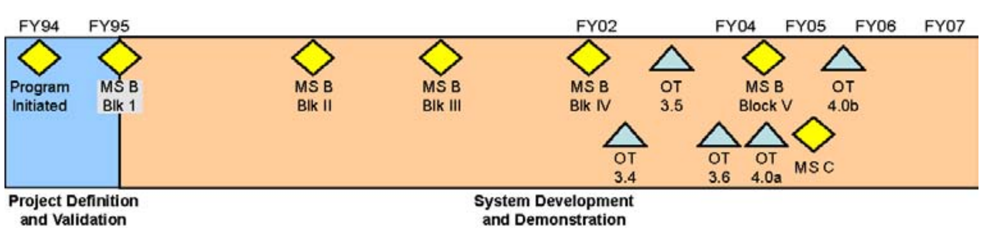
SYSTEM DESCRIPTION AND MISSION

GCCS-J is the central command and control system for achieving decision superiority described in Joint Vision 2020. It provides seamless battlespace awareness and a fused battlespace picture by exchanging data, imagery, intelligence, status of forces, and planning information. The GCCS supports interoperability by linking the National Command Authority down to the Joint Task Force, Component Commanders, and Service-unique systems. GCCS-J mission applications are Defense Information Infrastructure (DII) Common Operating Environment (COE) compliant and feature a constantly improving client/server architecture, office automation, government-developed military planning software, and increasing use of web technologies.

The GCCS-J Program Management Office determined that a two-part test for potential fielding of GCCS-J 4.0 would reduce risk and allow early fielding of selected capabilities:

- The GCCS-J 4.0(a) test would focus on Force Projection and Force Readiness mission areas.
- The GCCS-J 4.0(b) test would focus on updates to site infrastructure, server hardware, operating systems, relational database management systems, and DII COE version. GCCS-J 4.0(b) also upgrades the Common Operational Picture and Integrated Imagery and Intelligence applications.

TEST AND EVALUATION ACTIVITY



JITC conducted the GCCS-J 4.0(a) IOT&E in January 2004 at over 15 sites world-wide to determine the effectiveness and suitability of the new JOPES and SORTS portions of GCCS-J. The Program Management Office paused this test prior to the scheduled end of the test. GCCS-J 4.0(a) IOT&E resumed the test in June 2004 to determine effectiveness and suitability of JOPES and SORTS.

GCCS-J 4.0(b) IOT&E in March 2005 is intended to determine effectiveness and suitability of the significant upgrades to the operating system, relational database management systems, and hardware infrastructure, as well as upgrades to the Common Operational Picture and Integrated Imagery and Intelligence applications. This test will ensure the new upgrades continue to support the legacy 3.6.6 JOPES while the Defense Information Systems Agency (DISA) addresses needed improvements in JOPES.

TEST AND EVALUATION ASSESSMENT

GCCS-J v4.0(a) IOT&E , conducted by JITC in January 2004, focused on JOPES and SORTS, and resulted in a finding of not effective and not suitable.

The operational community provided good support to the testers with scenarios, personnel, installation architecture, and configuration information. The new JOPES architecture did not solve long-standing database synchronization and performance problems. Major shortcomings also included:

- Slow server processing resulting in large transaction queues.
- A large number of high priority problem reports.
- Interfaces with 6 of the 13 key systems.
- Security problems.

The rate at which users discovered new problems showed a lack of software maturity. Due to these early test results, DISA stopped the test, upgraded the JOPES servers and software, and recommended Concept of Operations changes to improve performance. The program offices for interfacing systems also made changes to improve interoperability. The GCCS-J program office scheduled a new test in June 2004, which revealed major improvement in JOPES software maturity.

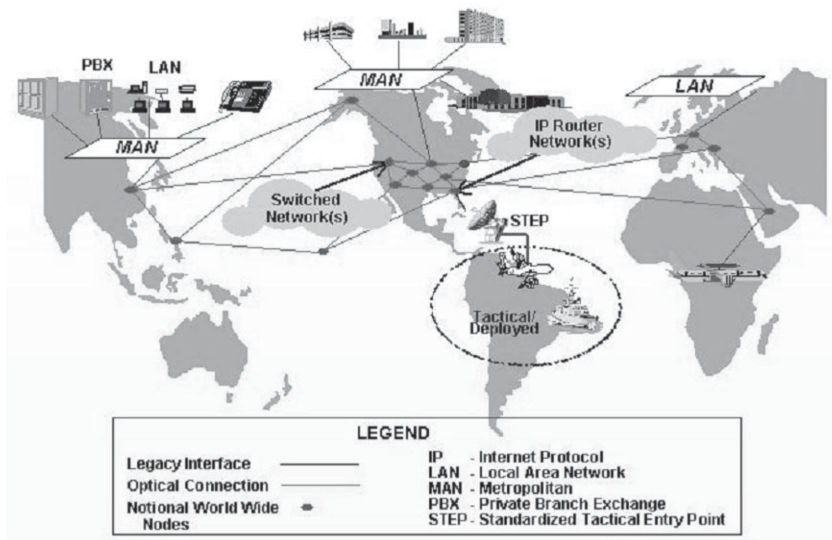
The SORTS portion of GCCS-J 4.0(a) performed very well during this test, and DISA expects to begin fielding SORTS. However, the JOPES servers were still too slow under threshold loading, and synchronization problems still occurred. Key interfacing systems such as the Deliberate and Crisis Action Planning and Execution System and GCCS-Army experienced problems. DISA is currently assessing the best way ahead for JOPES. The program office will need to address the two problem areas of database synchronization and server performance to meet user requirements.

DOT&E will continue to monitor testing of all GCCS-J releases.

Global Information Grid - Bandwidth Expansion (GIG-BE)

SUMMARY

- The Global Information Grid – Bandwidth Expansion (GIG-BE) Program is a key component of the Department of Defense's net-centric transformation initiative. It creates a constant "bandwidth-available" capability to improve information sharing.
- The operational assessment demonstrated the Network Management capabilities in place at Initial Operational Capability (IOC) are able to detect, diagnose, recover, and repair induced failures.
- The GIG-BE demonstrated that it is operationally effective. Several key policies, procedures, tools, and practices specific to GIG-BE operations were not completed or available during the IOT&E. However, by employing draft documentation, manual workarounds, and legacy practices, Global NetOps Support Center operators could successfully provision, operate, manage, and maintain the small IOC network. Regarding survivability, the IOC network has a one-year authorization to operate.
- Solutions to the suitability shortfalls are expected to be in place well before the full operational capability operational test and evaluation in FY05. Planning has begun for robust survivability and information assurance testing once a sufficient number of sites are on-line to establish a closed-loop "mesh" network and the overseas network operations centers are available.
- As the maturity of the GIG-BE architecture and supporting documentation increases, DOT&E will update our IOC assessment on operational suitability and survivability. There are no issues in either assessment area significant enough not to support a declaration of IOC.

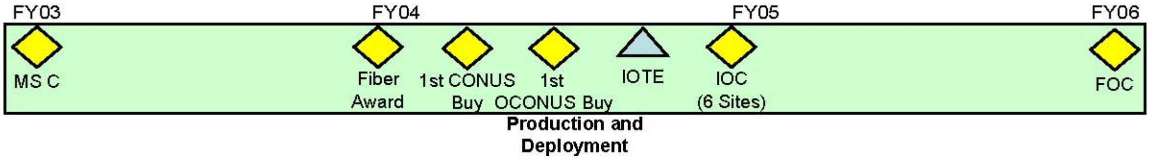


The GIG-BE Program is a key component of DoD's net-centric transformation initiative. It creates a constant "bandwidth-available" capability to improve information sharing for national security intelligence, surveillance and reconnaissance, and command and control.

SYSTEM DESCRIPTION AND MISSION

The GIG-BE Program is a key component of DoD's net-centric transformation initiative. It creates a constant "bandwidth-available" capability to improve information sharing for national security intelligence, surveillance and reconnaissance, and command and control. The GIG-BE is a secure, switched network interconnected by 800 Gigabits-per-second fiber optical trunks. It offers - along with other common protocols - advanced Internet Protocol user services, employs diverse connections for survivability, and provides "bandwidth on demand" from a flexible network management system. When fully deployed in FY05, GIG-BE will serve 92 of the most critical sites in the continental United States, Pacific, and European Theaters.

TEST AND EVALUATION ACTIVITY



DOT&E approved the GIG-BE Test and Evaluation Master Plan in July 2003 and the Operational Test Plan in June 2004. All the tests outlined in the Master Plan were executed as planned.

With the exception of some of the encryption components, the GIG-BE consists entirely of commercial products configured to DoD requirements using commercial methods to support a largely technical function – that of communication support. As a result, the operational test strategy built confidence progressively in a four-step process. The operational test agency – the Joint Interoperability Test Command:

- Observed selected integration tests conducted in a commercial laboratory on the individual components.
- Monitored the security and interoperability tests on a six-site test network in the field.
- Conducted an operational assessment of the GIG-BE network management functions on the six-site network prior to approval to carry operational traffic.
- Conducted an IOT&E of the GIG-BE's ability to carry operational traffic supporting each type of user service.

TEST AND EVALUATION ASSESSMENT

The Test and Evaluation Master Plan identifies three main test limitations for the GIG-BE at IOC. First, not all survivability aspects of the system are tested and assessed at IOC (encryption devices not accredited for TS/SCI traffic at IOC and the IOC architecture does not provide a closed-loop mesh network). Second, assessment of all planned configurations (stateside and overseas) is not possible until full operational capability. Third, given the small size of the network, observation of all network management functions is not possible.

Overall, the GIG-BE at IOC meets its effectiveness requirements. The GIG-BE transported all manner of user traffic and successfully interoperated with the various legacy DoD network services and systems. Testing highlighted the need for a Defense-wide policy on Internet protocols and ports to ensure consistent settings are identified to take advantage of GIG-BE capabilities. Wavelength services were exercised successfully in the laboratory and in a provisioning exercise during the IOT&E. Quality of Service assessments (latency, packet loss, and bit error rates), Class of Service assessments (priority/precedence), and transport and user services all performed well. The Joint Interoperability Test Command captured data on availability during the IOT&E, but will fully assess this full operational capability requirement once a more robust network is in place.

A full assessment of suitability is not possible until the GIG-BE matures. Several policies, procedures, and practices specific to GIG-BE operations were not available during the IOT&E. Global NetOps Support Center operators could successfully provision, operate, manage, and maintain the small IOC network by employing draft documentation, manual workarounds, and legacy practices. However, mature policies and practices, as well as GIG-BE Network Management System automated tools, are needed to do this on a larger scale network. Specific needs include finalizing the draft Concept of Operations describing policies and procedures; adjust the existing Provisioning guidance to account for unique GIG-BE requirements; complete the Logistics Support Plan covering maintenance standards, sparing, vendor response times, etc.; and complete and implement Standard Operating Procedures for configuration management, performance metrics, and other related activities for all the types of service nodes. The program office has been responsive to shortfalls identified during the installation process, the operational assessment, and the IOT&E and has already completed, or is working on, improvements and solutions.

Information Assurance is the only aspect of survivability that could be evaluated for the IOC network. The GIG-BE was granted a one-year Authorization to Operate – and the Joint Interoperability Test Command conducted an Information Assurance Controls assessment. However, before permanently moving significant amounts of user traffic onto the GIG-BE later in FY05, a demonstration of the following items is needed: automated fail-over to alternative routes with the

fiber optical mesh network, fail-over at dual service delivery node sites from the primary to the secondary service delivery node, and red team penetration testing and further information assurance testing. During the Full Operational Capability operational test and evaluation, the Continuity of Operations Plan back-up of the Global NetOps Support Center by other network centers, must also be exercised and evaluated.

The Joint Interoperability Test Command conducted the GIG-BE IOC IOT&E as outlined in the DOT&E-approved Test and Evaluation Master Plan and Operational Test Plan. Minor exceptions occurred resulting from the level of maturity in the architecture under test and supporting processes. DOT&E considers the GIG-BE as operationally effective. However, a final determination on operational suitability and survivability will be made as the maturity of the GIG-BE architecture and supporting documentation increases. There are no issues in either assessment area significant enough not to support a declaration of IOC.

Joint Biological Agent Identification and Diagnostic System (JBAIDS)

SUMMARY

- DOT&E approved an updated Test and Evaluation Master Plan and an Operational Assessment Plan on July 29, 2004.
- The Service Operational Test Agencies conducted an operational assessment August 9-12, 2004, at Eglin Air Force Base, Florida.

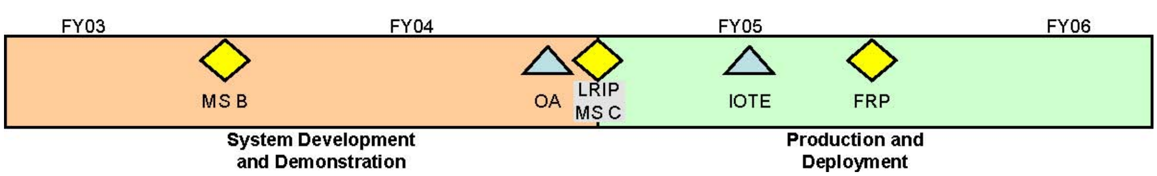
Military clinicians and other trained personnel plan to use JBAIDS to screen for biological agents.

SYSTEM DESCRIPTION AND MISSION

The Services intend the Joint Biological Agent Identification and Diagnostic System (JBAIDS) to be a reusable, portable, modifiable, biological agent identification and diagnostic system capable of identifying multiple biological agents of operational concern and other pathogens of clinical significance in clinical specimens and environmental samples. Military clinicians and other trained personnel plan to use JBAIDS to screen for biological agents given such factors as known or suspected threat agents and geographical endemic diseases. The system consists of an identification instrument based on polymerase chain reaction technology, a laptop computer with application software, a storage/shipping case, assay test kits, support equipment, and other laboratory consumables. The Services intend to field JBAIDS to forward-deployable medical treatment facilities, area and theater medical laboratories, laboratories and clinics on ships, and high-threat fixed sites.

The JBAIDS program has three developmental blocks to expedite procurement and fielding while reducing technical risk. Block I uses commercial off-the-shelf technology capable of identifying 10 biological warfare agents within 40 minutes after completion of the test sample extraction process from either a clinical or environmental sample. Since there are already several versions of polymerase chain reaction technology in use by the Services, a Block I goal is to standardize a single system for all Services. Block II will add toxins to its target list of biological warfare agents. Users intend Block III to be a hand-held unit with a capability to identify 50-70 agents with automated sample preparation. It is intended for use by non-medical personnel. Initial fielding of the Block I and II systems is not contingent upon approval from the Food and Drug Administration (FDA). The FDA approval process will be initiated during Block I and will continue throughout the development process for all blocks. Block III should provide an FDA approved diagnostics device. Block III will interface with the Joint Warning and Reporting Network and medical patients' records/medical surveillance systems.

TEST AND EVALUATION ACTIVITY



DOT&E approved an updated Test and Evaluation Master Plan and an Operational Assessment Plan on July 29, 2004. The Service Operational Test Agencies conducted the operational assessment August 9-12, 2004, at Eglin Air Force Base, Florida. Analysis and evaluation of the data from that event is ongoing.

TEST AND EVALUATION ASSESSMENT

The Operational Assessment results will be considered in the low-rate initial production decision scheduled for 1QFY05. It will assess progress toward effectiveness and suitability, and readiness for IOT&E scheduled for 3QFY05. The Operational Assessment will assess four areas: operational effectiveness, operational suitability, and operational impacts; programmatic voids; program documentation; and the ability to provide information to support the existing war fighting process. The IOT&E must address all target biological warfare agents in appropriate matrices using inactivated threat representative agents. An objective of the test program is to validate the relevancy of test results using inactivated biological agents. The applicability and timeliness of JBAIDS reporting information must be sufficient to support decision-makers and mission accomplishment.

Scheduling operational assessments or tests in conjunction with training exercises enhances the realism of the test environment and provides a command and control context not otherwise available; but such a strategy is risky. Although the plan called for this assessment to be integrated with an exercise, Eglin Air Force Base cancelled the exercise due to an approaching tropical storm. Earlier in May 2004, Holloman Air Force Base, New Mexico, cancelled an exercise that the Operational Test Agencies had expected to use for this operational assessment. In the case of an operational assessment supporting a low-rate initial production decision, the reduced scope of the test is acceptable. Had this event been the initial operational test and evaluation, the reduction in scope would not be acceptable.

Joint Biological Point Detection System (JBPDS)

SUMMARY

- Multi-Service Operational Test Evaluation (MOT&E) Phases II, III, and V took place at Eglin Air Force Base, Florida, in November 2003.
- Despite test and evaluation limitations, the Joint Biological Point Detection System (JBPDS) may provide capability to detect and identify biological warfare agents.
  - Results from MOT&E indicate that detection and presumptive identification of simulants are available within 20 minutes, with confirmatory analyses depending on the location of the laboratory, in an average of 12 hours after encountering a biological cloud. This may support timely prophylactic treatment decisions for biological warfare agents except for toxins.
  - Emerging results from the component-level laboratory testing of biological warfare agents and their simulants has provided useful data, but the performance relationships between agents and their simulants is not adequate to predict the performance of JBPDS to detect and identify biological warfare agents in the field. Consequently, valid estimates of field JBPDS probabilities of detection and identification are not available.
- The significant test and evaluation limitation is not to challenge the JBPDS with realistic threats in the field due to safety and environmental issues. Whole-system live agent testing is required to characterize the JBPDS agent to simulant relationship.

Despite test and evaluation limitations, JBPDS may provide capability to detect and identify biological warfare agents.

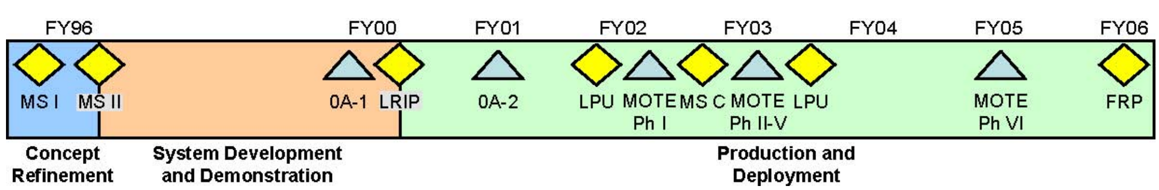
SYSTEM DESCRIPTION AND MISSION

The Services intend the JBPDS to provide early detection and identification of biological warfare agents in order to treat affected forces. It will provide biological agent point-detection, identification, and sampling capability for both fixed-site and mobile operations. The system must automatically detect and identify up to ten biological warfare agents simultaneously in less than 15 minutes.

The Services intend the JBPDS to be integrated into the Joint Services Light Nuclear, Biological, and Chemical Reconnaissance System and the Stryker Nuclear, Chemical, and Biological Reconnaissance Vehicle.

In December 1996, the JBPDS transitioned into the engineering and manufacturing development phase. DOT&E placed the JBPDS on oversight in January 2000. The JBPDS-Block 1 entered low-rate initial production (LRIP) in October 2000. A JBPDS LRIP Expansion decision followed in 2002. The Army submitted an Urgent Need-fielding request for JBPDS in February 2002 due to the heightened threat to deployed forces. A Milestone C LRIP for 409 systems was held in for 4QFY04.

TEST AND EVALUATION ACTIVITY



MOT&E Phases II, III, and V took place at Eglin Air Force Base, Florida, in November 2003. Phase II supported the Air Force Urgent Need request and included the man-portable and trailer variants. Phase III, run concurrently with Phase II, was a cold weather operational test at McKinley Climatic Laboratory, Eglin Air Force Base. Phase V was a follow-on test for the Army to confirm that changes made as a result of Phase I had not degraded the performance of the JBPDS. For testing efficiency, one portion of Phase V occurred concurrently with the Air Force Phase II and Phase III testing at Eglin while a second portion of the Phase V testing took place at Fort McClellan, Alabama, in conjunction with a training exercise. The Navy conducted Phase IV in January 2004 onboard the USS *The Sullivans* (DDG 68). Plans for Phase VI call for repeating previous phases with production articles if necessary. Component level testing took place in laboratories at Dugway Proving Ground using live biological agents and their simulants.

TEST AND EVALUATION ASSESSMENT

Despite test and evaluation limitations, JBPDS may provide capability to detect and identify biological warfare agents. Results from MOT&E indicate that detection and presumptive identification of simulants are available, with confirmatory analyses depending on the location of the laboratory, in an average of 12 hours after encountering a biological cloud. Early detection and identification of biological warfare agents provides the opportunity for prophylactic treatment, depending on the agent (three biological agents do not have a prophylactic treatment). However, because of the rapid onset of the effects of toxins, 12 hours is not timely enough to effect prophylactic treatment for the one toxin for which such a treatment exists. JBPDS information produced at any time can be used to quarantine, decontaminate, and plan for impact on forces. Actions to reduce the full effects of exposure by donning protective equipment, isolate exposed personnel, and restrict troop movement would be effective in reducing causalities.

To estimate the JBPDS field probabilities of detection and identification, simulants were chosen to represent each of four classes of biological warfare agents: toxins, viruses, vegetative bacteria, and spore bacteria. The evaluation methodology is to relate the JBPDS performance to detect and identify biological agents in a controlled environment to its performance to detect and identify their respective simulants. Emerging results from the component-level laboratory testing of biological warfare agents and their simulants has provided useful data, but the performance relationships between agents and their simulants is not adequate to predict the performance of JBPDS to detect and identify biological warfare agents in the field. Whole-system live agent testing (WSLAT) is required to characterize the JBPDS agent to simulant relationship. The infrastructure to conduct such a test does not currently exist. A Requirements Capability Document for WSLAT was generated to identify key parameters and capabilities. A Committee from the National Research Council, sponsored by the Joint Program Executive Office – Chemical, Biological Defense Program, reviewed a feasibility study prepared for WSLAT, assessed the risks associated with WSLAT execution, and made recommendations, which need to be addressed. At present, the Joint Project Manager is developing a methodology that accommodates the National Research Council's recommendations. Adequate whole-system testing, along with operational field test data, will be the basis for characterizing JBPDS biological warfare and simulant detection performance in support of a full-rate production decision.

The Air Force man-portable and trailer variants did not meet many of the evaluation criteria for effectiveness and suitability during the MOT&E at Eglin Air Force Base. Major system failures included a high false-positive rate and communication failures. All variants experienced a high machine false-positive rate. Following the MOT&E, the Joint Project Manager conducted system-level demonstrations of corrective actions for communication and machine false-positives, which indicated that the issues were resolved. Additional testing will assess the corrective actions in an operational environment.

Joint Biological Standoff Detection System (JBSDS) (Increment 1)

Questions remain regarding the relationship of the system's performance in detecting simulants with its performance in detecting live agents in a field environment.

SUMMARY

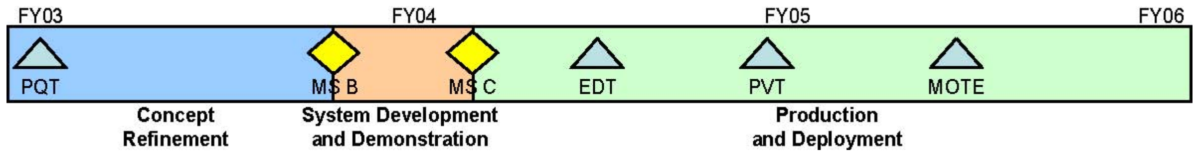
- In June 2003, the Office of the Joint Project Manager, NBC Contamination Avoidance, (JPM NBC CA) conducted a Joint Biological Standoff Detection System (JBSDS) Increment 1 Production Qualification Test as a competition between contractors. Neither candidate system demonstrated the Milestone C entrance criteria of probability of detection, probability of discrimination, mean time between false alarms, weight, reliability, and availability.
- On April 28, 2004, DOT&E approved a Test and Evaluation Master Plan (TEMP), which provides for two additional operational assessments; one based on the engineering development test planned for 2Q/3QFY05 to address the entrance criteria not previously met, the other to be conducted after the production verification test planned for 2QFY05 to support the decision to begin Multi-Service Operational Test and Evaluation during 4QFY05.
- We are concerned whether gamma-irradiated biological warfare agents or other non-lethal simulants can adequately represent live biological warfare agents in realistic operational tests.

SYSTEM DESCRIPTION AND MISSION

The JBSDS Increment 1 is to provide an interim capability for early warning of a biological warfare agent attack. The JPM NBC CA plans to produce 24 systems. The Air Force and Army intend to deploy the system at fixed sites or mount the system on vehicle platforms such as the high-mobility multi-purpose wheeled vehicle (HMMWV). The users require the system to detect biological aerosol clouds at distances up to five kilometers; to range and track aerosol clouds; and to discriminate clouds of biological origin from other clouds and normal background levels of biological aerosols at ranges of up to one kilometer. The system is not intended to identify the specific biological content of a cloud; this must be done by an air sampling point detection system.

All Services intend to employ Increment 2 systems, which are required to be fully interoperable with command and control systems, and to have increased detector sensitivity and range. Increment 2's communications, cloud tracking, and analysis will be fully automated. Additionally, it will operate from mobile reconnaissance platforms. It will also provide a shipboard and fixed-site standoff biological detection capability.

TEST AND EVALUATION ACTIVITY



In June 2003, the office of the JPM NBC CA conducted the JBSDS Increment 1 Production Qualification Test as a competition between contractors. The test provided technical data, which the JPM NBC CA used to select one contractor for low-rate initial production of six systems. Neither candidate system demonstrated the Milestone C entrance criteria of probability of detection, probability of discrimination, mean time between false alarms, weight, reliability, or availability. On April 28, 2004, DOT&E approved a TEMP, which provides for two additional operational assessments; one based on the engineering development test planned for 1QFY05 to address the entrance criteria not previously met, the other after production verification test planned for 2QFY05 to support the decision to begin Multi-Service Operational Test and Evaluation during 4QFY05.

TEST AND EVALUATION ASSESSMENT

Test planning appears adequate; however, some questions remain regarding the relationship of the system's performance in detecting simulants with its performance in detecting live agents in a field environment. The JPM NBC CA has coordinated with Sandia National Laboratory and Dugway Proving Ground to study the effects of gamma irradiation and heat as a means of inactivating both simulants and agents. We are concerned whether gamma-irradiated biological warfare agents or other non-lethal simulants can adequately represent live biological agents in realistic operational tests and evaluation.

Joint Chemical Agent Detector (JCAD)

SUMMARY

- The Joint Chemical Agent Detector (JCAD) program was restructured during this fiscal year.
- Late in FY04, testing started for initial chemical detection and false alarm rejection testing of several commercial off-the-shelf (COTS) candidate devices.
- Evaluation for effectiveness, suitability, and survivability of the selected JCAD will occur in FY05.
- The JCAD's Test and Evaluation Master Plan is currently under revision and staffing within the Services.

SYSTEM DESCRIPTION AND MISSION

The Services envision JCAD as a hand-held device that automatically detects, identifies, and warns users of the presence of nerve, blister, and blood chemical agents. The intent is to fasten JCAD to the operator's load-bearing equipment or mount it on a ground vehicle, aircraft, or ship.

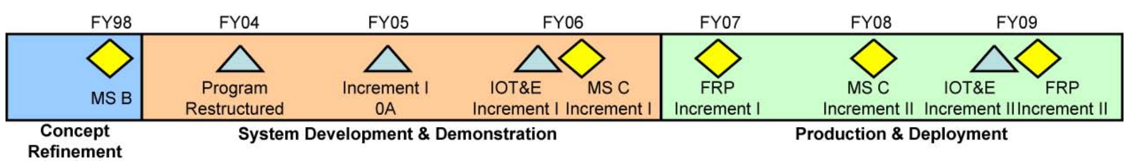
Increment I will provide a chemical detection capability that automatically and simultaneously detects, identifies, and quantifies acute point exposure of chemical warfare agent vapors by agent class and will be employed on individuals, vehicles, naval ships, and fixed site installations.

Increment II will provide all the capabilities of Increment I, with the addition of a capability to determine cumulative exposure and enhanced sensitivity. The JCAD Increment II will be employed on individuals, vehicles, naval ships, fixed site installations, and aircraft interiors.

The Services intend JCAD to replace the currently fielded M22 Automatic Chemical Agent Detector Alarm, Chemical Agent Monitor, Improved Chemical Agent Monitor, M8A1 Automatic Chemical Agent Alarm, and other unique Service detectors and alarms. All Services will use one basic JCAD configuration.

In October 2003, the Joint Program Executive Office for Chemical and Biological Defense (JPEO-CBD) determined that the JCAD program was in breach of its Acquisition Program Baseline. The JCAD technology, then under development, was not meeting technical performance, cost, or schedule goals. The detector did not meet the detection requirement for two of the required nine chemical warfare agents, had an unacceptably high false alarm rate, and experienced degradation following exposure to chemical agents. The JPEO-CBD restructured the JCAD program into the two increments defined above. The restructured program relies on selecting COTS devices to meet the users' requirements.

TEST AND EVALUATION ACTIVITY



The Services are currently staffing the JCAD's Test and Evaluation Master Plan.

During August and September of 2004, the Army's West Desert Test Center at Dugway Proving Ground, Utah, conducted initial JCAD chemical surety testing. This testing supported an initial assessment of the chemical warfare agent detection capabilities of the COTS devices submitted by four manufacturers versus the performance of the currently fielded M22.

Also in August and September 2004, the Army's Developmental Test Command evaluated the performance of each of the COTS devices in rejecting false alarms while operating in several real world environments during a series of one-week monitoring events. These events took place at Nellis Air Force Base; Philadelphia Naval Shipyard; the Port of Norfolk,

Virginia; Ft. Hood, Texas; Wallops Island, Virginia; and Eglin Air Force Base. Combined with the initial chemical surety test data, this limited screening will allow the Joint Program Office to select, in early FY05, one or more COTS devices to continue on to a more rigorous round of testing during FY05.

TEST AND EVALUATION ASSESSMENT

Chemical agents used on the battlefield or in terrorist incidents are unlikely to be pure chemical agents. Rather, these agents would contain impurities, stabilizers, by-products, and decomposition products. JCAD chemical surety testing must include challenging the JCAD with threat-realistic agents, as well as other mixes that threat forces would likely use against United States or allied forces.

Adequate JCAD operational testing must include the robust use of chemical agent simulants to evaluate the response of the JCAD, its operators, and the operators' associated units to simulated chemical agent challenges. Before these simulants are used under field conditions, the response of the JCAD to these simulants must be related to the response of the JCAD to actual chemical warfare agents. The JCAD testers must also address Service concerns about any hazards to personnel and equipment that are properties of some candidate simulants.

Joint Service Light NBC Reconnaissance System (JSLNBCRS)

SUMMARY

- The Joint Service Light Nuclear, Biological, and Chemical Reconnaissance System (JSLNBCRS) is a reconnaissance vehicle utilized by the Army, Air Force, and Marine Corps.
- A Limited User Test for the High-Mobility Multi-purpose Wheeled Vehicles (HMMWV) in FY02 highlighted numerous performance and design issues. As a result, the system re-entered engineering development to address these issues. The system will re-test these issues in the First Article Test in FY05.

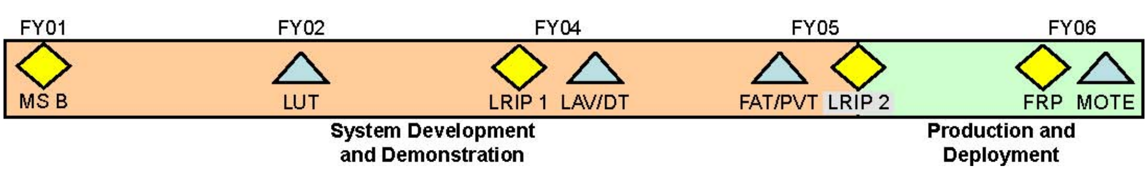
The Services intend to employ the JSLNBCRS as a mobile system to detect and report chemical, biological, radiological, and nuclear hazards on the battlefield.

- Low-rate initial production (LRIP) for the HMMWV is in two phases. Phase I will produce six HMMWV systems for First Article Testing and Production Verification Testing.
- If performances in the First Article and Production Verification tests are successful, then Phase II will complete fabrication of the remaining eight HMMWV systems and procure 16 Light Armored Vehicles (LAV) chassis. Four production-representative HMMWV and two LAV systems will support multi-Service operational test and evaluation in 2006.

SYSTEM DESCRIPTION AND MISSION

The Services intend to employ the JSLNBCRS as a mobile system to detect and report chemical, biological, radiological, and nuclear (CBRN) hazards on the battlefield. The JSLNBCRS consists of a base vehicle equipped with hand-held and vehicle-mounted CBRN detection and identification equipment. The Services intend that JSLNBCRS detect, sample, and identify known CBRN agents, as well as toxic industrial materials. The communications suite will format and transmit analog and digital CBRN reports in accordance with the CBRN Warning and Reporting System to provide CBRN contamination predictions and warnings to battlefield commanders. The Services desire the system to mark contaminated areas, using standardized NATO hazard markers. Onboard meteorological and global positioning systems provide the system with real time, local meteorological, and navigational information. Two base vehicles are planned: the HMMWV for the Army, Air Force, and Marine Corps; and the LAV for the Marine Corps only.

TEST AND EVALUATION ACTIVITY



DOT&E approved the updated Test and Evaluation Master Plan (TEMP) on January 8, 2004.

The contractor performed an initial engineering Design Test of the LAV variant at the Nevada Automotive Test Center from August to October 2004; results are pending.

TEST AND EVALUATION ASSESSMENT

During the past year, lessons learned from the LUT were evaluated and corrections made to the system with plans to test them in the First Article and Production Verification Tests in FY05. The test evaluators must establish pre-integration baselines for the primary onboard sensors to evaluate whether sensor performance has been degraded because of integration into the JSLNBCRS base vehicles.

The standoff chemical sensor emits a distinctive reflection from its faceplate, which is readily detectable by the naked eye. Anecdotal evidence also suggests that this reflection might be a problem in moonlight conditions. The detector has been fitted with a protective shield to lessen the reflection.

Developmental testing for the LAV variant, First Article Testing of the HMMWV system, and field sensor testing are key to demonstrating system readiness for LRIP II and the Initial Operational Test and Evaluation. The Joint Project Manager must develop strategies to fulfill the standoff chemical agent detection requirement should the standoff detector not be available to satisfy its requirement.

Joint Service Lightweight Standoff Chemical Agent Detector (JSLSCAD)

SUMMARY

The Army's test of the JSLSCAD Increment 1with the Stryker NBC Reconnaissance Vehicle during October and November 2003 demonstrated performance that did not meet requirements.

- In September 2003, the Joint Program Executive Office for Chemical and Biological Defense restructured the program into Increments, requiring separate Test and Evaluation Master Plans (TEMPs) for each Increment.
  - The Army will mount the mobile configuration of Joint Service Lightweight Standoff Chemical Agent Detector (JSLSCAD) Increment 1 on the Stryker Nuclear, Biological, and Chemical (NBC) Reconnaissance Vehicle.
  - The Services require integration of the JSLSCAD Increment 2 into the Joint Service Lightweight NBC Reconnaissance System (JSLNBCRS), and employment at fixed sites such as air bases and aboard Navy landing ship docks (or equivalent aviation capable amphibious ships).
- The Army's test of the JSLSCAD Increment 1with the Stryker NBC Reconnaissance Vehicle during October and November 2003 demonstrated performance that did not meet requirements.
- The greatest challenge evaluating this system is to estimate its field performance to detect chemical warfare agents using simulants. This is to be accomplished through the use of modeling and simulation in accordance with recommendations from the National Research Council.

SYSTEM DESCRIPTION AND MISSION

The Army intends the JSLSCAD Increment 1 to be a passive detector of chemical agent vapors at ranges from 0 to 2 kilometers when mounted in the Stryker NBC Reconnaissance Vehicle to provide real-time detection of specific classes of chemical warfare threats while on-the-move.

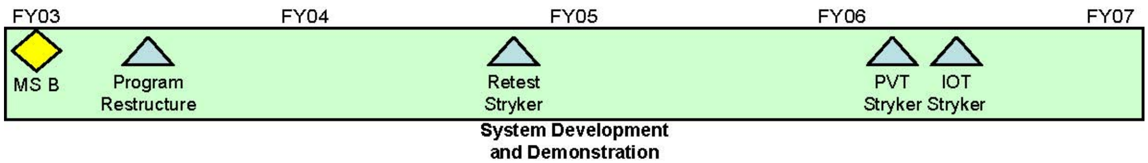
The JSLSCAD will have visual and audible indicators to display the chemical agent class (nerve and blister), and to indicate the azimuth and elevation (but not distance) to the detection. The operator may review and distribute the information manually or it will automatically be sent into Service command, control, communications, computers, and intelligence (C4I) systems via the host vehicle's communications systems. JSLSCAD is to be interoperable with the Joint Warning and Reporting Network when that system becomes available.

JSLSCAD Increment 1 consists of three major components: scanner module, sensor electronics module, and operator display unit. The Army plans to use the mobile configuration of JSLSCAD Increment 1 in the Stryker NBC Reconnaissance Vehicle.

Plans call for integration of JSLSCAD Increment 2 into the JSLNBCRS, and for employment at fixed sites such as air bases and aboard Navy landing ship docks (or equivalent aviation capable amphibious ships).

Army and Navy helicopters, as well as selected Air Force C-130 aircraft, will carry JSLSCAD Increment 3. Present plans call for the JSLSCAD to be carried as an unmanned aerial vehicle payload, but the unmanned aerial vehicle has not been selected.

TEST AND EVALUATION ACTIVITY



The Army tested Increment 1 with the Stryker NBC Reconnaissance Vehicle during October and November 2003. Because it did not perform well, its processing algorithm was altered and it was re-tested in June 2004. JSLSCAD did not meet its minimum detection requirements in either test. In September 2003, the Joint Program Executive Office for Chemical and Biological Defense decided to restructure the program into Increments, requiring TEMPs for each Increment.

TEST AND EVALUATION ASSESSMENT

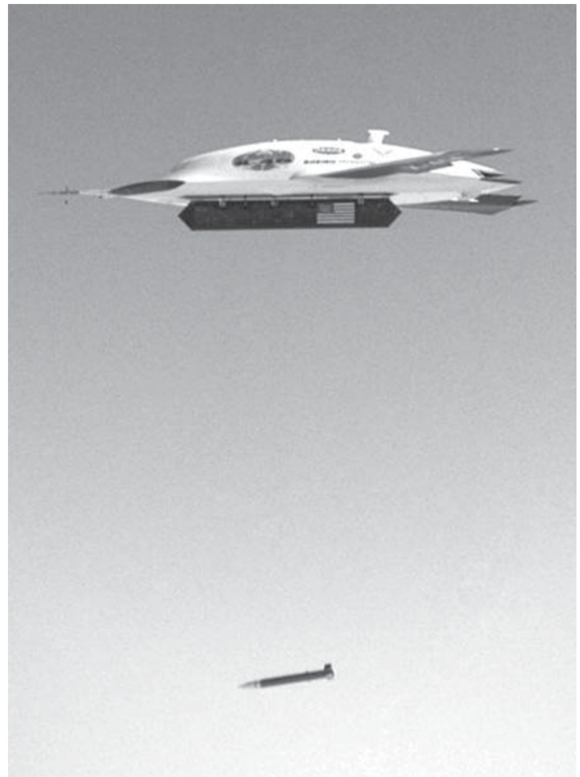
The program was restructured to address detection and identification processing problems. The proposed strategy is to use a limited number of the Increment 1 systems for integration into the Stryker Reconnaissance Vehicle. Three contractors have submitted their systems for the Increment 2 selection as a commercial buy upon completion of government testing. A test and evaluation strategy supporting this plan will be documented in the Increment 2 TEMP. The test strategy must include a protocol (such as that recommended by the National Research Council (NRC) for passive infrared standoff detectors) that can provide confidence that JSLSCAD can detect and identify actual chemical warfare agents in a realistic environment at standoff distances. Test limitations in the multi-Service operational test and evaluation will include the use of simulants instead of actual agents in field testing. Although the chosen simulants approximate spectral or physical characteristics of agents, they do not match them. Current testing is intended to support the ability to create a relationship between detecting and identifying concentration levels of real chemical vapors and concentration levels of simulant vapors used for field testing. Although a relationship between chemical warfare agents and their simulants can be established in a laboratory chamber setting, the relationship does not appear to carry over to field releases of the simulants. Implementation of the NRC recommendations is essential for an adequate test and evaluation strategy.

Other test limitations include the simulation of agent delivery by explosive, line, and stack-release devices instead of actual weapons and a restricted network warning capability instead of a full-theater or joint task force C4I system. Achieving ideal delivery conditions during tests is difficult; the uncertainties of weather and the desired effects of the atmospheric mixing layer dictate that releases are best made during pre-dawn hours, but this is the same challenge any threat force would face. The test site at Dugway, an isolated, desert location that does not represent military bases, cities, or many types of battlefields where JSLSCAD likely will be deployed, is a limitation. The Navy plans to conduct a test at sea, and the Air Force will test the system at Eglin Air Force Base.

Joint Unmanned Combat Air Systems (J-UCAS)

SUMMARY

- The Joint Unmanned Combat Air Systems (J-UCAS) program is an Advanced Technology Demonstration. The program will demonstrate the potential of unmanned aerial vehicles to perform the following missions:
    - Suppression of Enemy Air Defenses and Strike from a low observable platform
    - Electronic Warfare support/ Electronic Attack
    - Persistent Intelligence, Surveillance, and Reconnaissance
- The J-UCAS program comprises:
    - Boeing X-45C unmanned vehicle
    - Northrop Grumman X-47B unmanned vehicle
    - Common Operating System
- Operational assessments of the J-UCAS will occur in the FY07-12 timeframe. The Services can initiate a decision to enter into a formal acquisition program at any point.



X-45A accomplishments include the release of an inert, GPS-guided 250 pound bomb from its internal weapons bay.

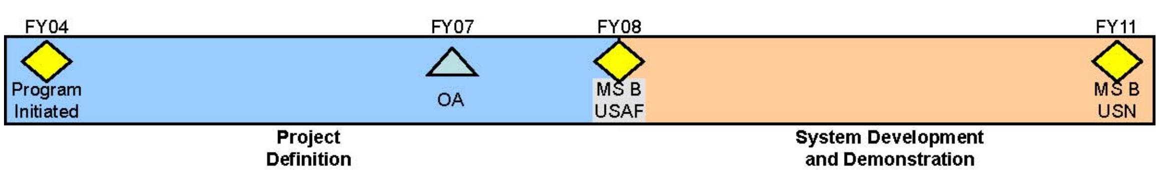
SYSTEM DESCRIPTION AND MISSION

J-UCAS stood up as a Joint Defense Advanced Research Projects Agency/Air Force/Navy Advanced Technology Demonstration program during 2004. The J-UCAS program combined the Unmanned Combat Aerial Vehicle–Air Force and the Unmanned Combat Aerial Vehicle–Navy programs. The Defense Advanced Research Projects Agency is leading the overall effort. They are responsible for the planning and execution of a joint system technology demonstration program, support of the Services' independent operational assessment, and support preparations for potential acquisition transition options that align with emerging Air Force and Navy requirements.

The Boeing X-45C and Northrop Grumman X-47B development efforts will produce multiple air vehicles with significant survivability, range, and persistence. The vehicles will also integrate sensor, weapons, and communications systems. The Boeing X-45C has an increased emphasis on survivability.

The Northrop Grumman X-47C will provide the capability for limited carrier suitability demonstrations. The Common Operating System provides the functionality and interfaces for command and control, autonomous operations communications management, and system health and status reporting. The Common Operating System is an open architecture system.

TEST AND EVALUATION ACTIVITY



J-UCAS flight-tested the Boeing X-45A air vehicle with Block 2 software. This block of software provides weapons delivery capability and multi-vehicle operations. These flight test events are part of the risk reduction effort for J-UCAS and are a flow down from the Unmanned Combat Aerial Vehicle–Air Force contract.

Boeing X-45A accomplishments include:

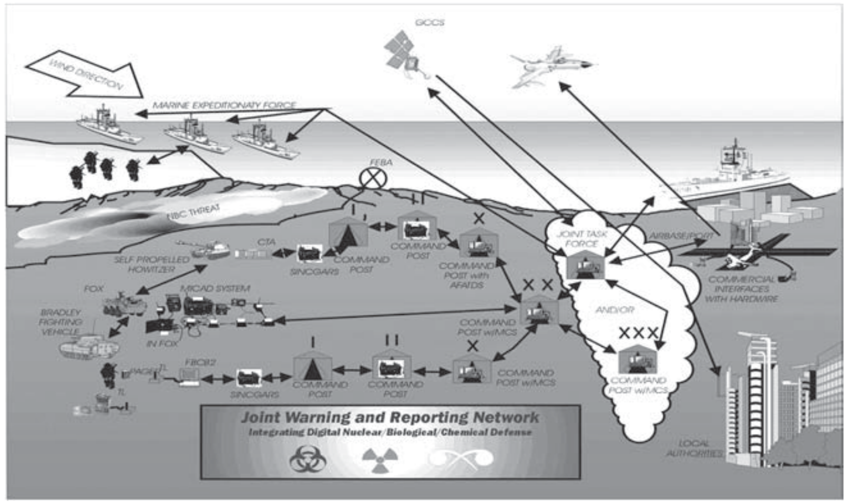
- Release of an inert, unguided 250-pound bomb from its internal weapons bay.
- Release of an inert, GPS-guided 250 pound bomb from its internal weapons bay.
- Conduct of a formation flight with two X-45A vehicles.

TEST AND EVALUATION ASSESSMENT

The development of the integrated operational assessment plan is in the initial stages. Early involvement of the Operational Test Activities is important to ensure an independent, operational perspective is available to inform program decision-making. An operational assessment should be an entrance requirement for the Milestone B decision.

Joint Warning and Reporting Network (JWARN) Block II

SUMMARY



JWARN will collect, edit, and disseminate CBRN reports and predict downwind hazards in accordance with NATO procedures.

- The Joint Program Manager for Information Systems (JPM-IS) took control of project management for the Joint Warning and Reporting Network (JWARN) program in early July 2003.
- The JPM-IS modified the existing acquisition strategy, which the Marine Corps Systems Command had previously developed. The new strategy, approved in February 2004 by the Under Secretary of Defense, Acquisition, Technology, and Logistics, combines two block developments into one for greater capability and earlier fielding.
- The Program Manager will develop Block II in two phases, Phase 1 (B2P1) and Phase 2 (B2P2). Phase 1 is just a development stage, intended to reduce risk and streamline testing. The JPM-IS will only field Phase 2.
- The JWARN Interim Capability (JIC) is a developmental tool. The intent is to deploy it to various agencies and schoolhouses, in early FY05, to develop concept of operations and provide user feedback. The Services do not intend to field the JIC to operational forces.

SYSTEM DESCRIPTION AND MISSION

The Services intend JWARN to provide joint forces with a comprehensive analysis and response capability to minimize the effects of chemical, biological, radiological, and nuclear (CBRN) attacks, accidents, and incidents. It will provide the operational capability to employ CBRN warning technology. This technology will collect, analyze, identify, locate, report, and disseminate CBRN warnings. The JWARN will be compatible and integrated with Joint and Service-specific common and non-common operating environment-based tactical Command, Control, Computers, and Communications, Intelligence, Surveillance, and Reconnaissance (C4ISR) systems.

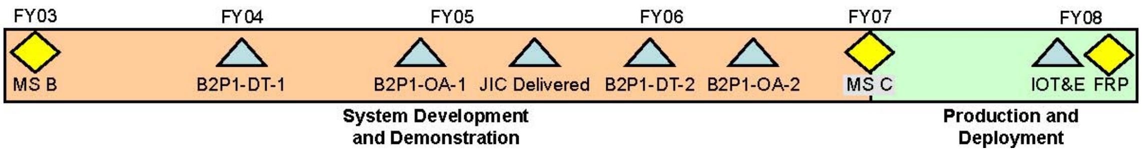
The JWARN system consists of the JWARN mission application software and an interface device.

- The mission application software will be hosted on Joint and Service Global Command and Control Systems (GCCS), and Service tactical C4ISR systems including Command and Control Personal Computer, Joint Tactical Common Operational Picture Workstation, Advanced Field Artillery Tactical Data System, Force XXI Battle Command and Control Brigade and Below.
- The JWARN Component Interface Device is a hardware device that provides connectivity between CBRN sensors and the C4ISR network.

JWARN will collect, edit, and disseminate CBRN reports and predict downwind hazards in accordance with NATO procedures.

The system will share information with the Joint Operational Effects Model, which will generate hazard prediction plots for display on operational graphics.

TEST AND EVALUATION ACTIVITY



Developmental Testing 1 (DT1), conducted in August and September 2004, focused on the B2P1 JWARN Mission Application Software and its integration with GCCS-Joint and GCCS-Maritime. It exercised the interfaces with current hazard prediction models such as Hazard Prediction and Assessment Capability. The result of this test will be available after December 2004. An operational assessment is planned in FY05 to assess the capabilities of B2P1.

The Test and Evaluation Master Plan is currently under revision to reflect the new acquisition strategy and testing guidance from DOT&E. Projected submission to the Joint Program Executive Office – Chemical/ Biological Defense is December 2004.

TEST AND EVALUATION ASSESSMENT

Timely warning and reporting within a systems-of-systems test with JWARN, the C4ISR networks, the JWARN JCID, the Joint Operational Effects Model, and CBRN sensors will be key in determining the systems' overall effectiveness and suitability.

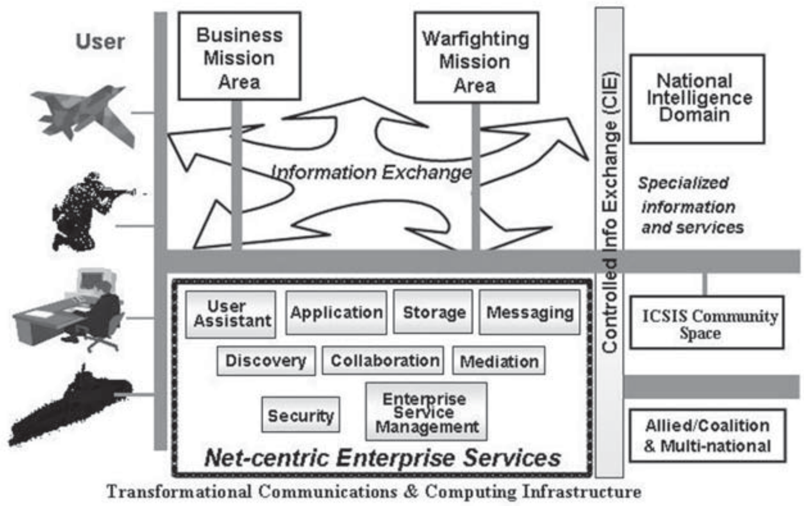
Although the Services will not field B2P1, the JPM-IS and the contractor must maintain sound configuration control of this software. They must correct any deficiencies discovered in Developmental Testing 1 for the early operational assessment to be meaningful.

JWARN is a software system that is connected to the Global Information Grid. Operational testers must assess security measures, vulnerabilities, and Information Assurance in a robust operational environment. To this end, operational testers will use Red Teams to attempt to disrupt the system or gain access to critical operational information on the C4ISR hosts. A waiver from NATO is required in order to employ NATO Restricted AEP-45 methodology on non-NATO C4ISR networks. JPM-IS is seeking this waiver.

Net-Centric Enterprise Services (NCES)

SUMMARY

- Net-Centric Enterprise Services (NCES) is not a single system or part of a family-of-systems or system-of-systems; it is a suite of services.
- NCES capabilities include on-demand access, collection, processing, storage, dissemination, and management of information to warfighters, policy-makers, and support personnel.
- DOT&E approved the NCES Test and Evaluation Strategy in support of a July 2004 Milestone A. The strategy uses the concept of testing Evaluation Capability Modules (ECMs) - a "bundle" of various NCES services.



NCES enables the end user to do an intelligent pull of mission-tailored information from anywhere within the network.

- The NCES program is pursuing an aggressive schedule with Milestone B approval in 4QFY05. The Test and Evaluation Master Plan (TEMP) development is in its very early stages.

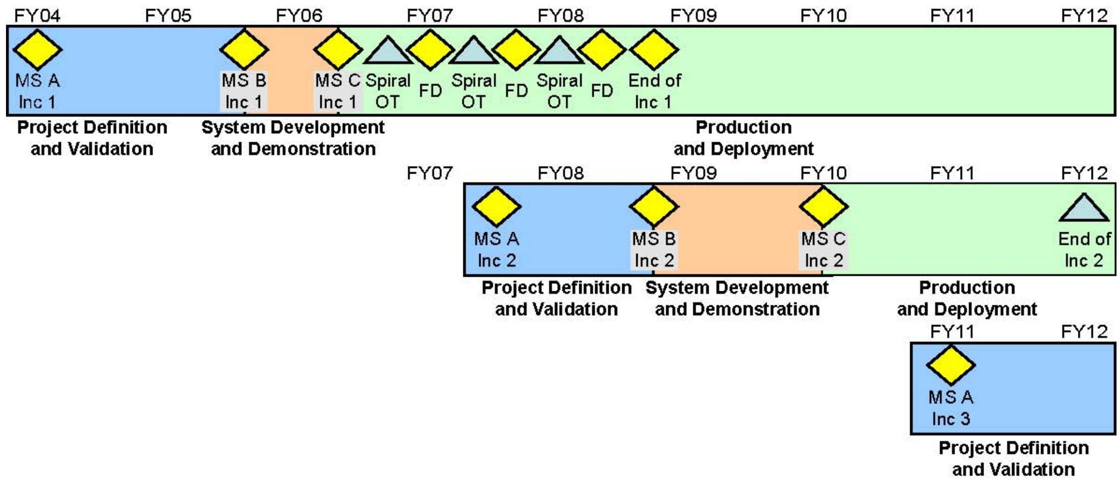
SYSTEM DESCRIPTION AND MISSION

NCES is not a single system or part of a family-of-systems or system-of-systems; it is a suite of services. These services receive a request for data from a user and then satisfy that request by getting data or information from various other systems "plugged" into the network. The NCES enables the end user to do an intelligent pull of mission-tailored information from anywhere within the network with minimal delay, ensuring the timeliness and relevance of the data. NCES is a collaborative effort of the Joint Staff, the Assistant of the Secretary of Defense for Networks and Information Integration, and the Defense Information Systems Agency.

Services provided by NCES must be compatible with the Global Information Grid (GIG). NCES (which is part of the GIG Enterprise Services) provides a common set of net-centric, interoperable information capabilities across the GIG, and replaces the Defense Information Infrastructure Common Operating Environment. NCES capabilities include on-demand access, collection, processing, storage, dissemination, and management of information to warfighters, policy-makers, and support personnel. NCES supports the entire DoD and Intelligence communities, conventional and nuclear warfighting, and business elements. It acts as the interface between DoD and non-DoD organizations.

The program follows an evolutionary acquisition strategy. NCES currently consists of three increments, with multiple spirals per increment. Fielding of the Increment 1 spirals starts in FY07 and ends in FY09.

TEST AND EVALUATION ACTIVITY



The program entered the acquisition process with a Milestone A review in July 2004. DOT&E approved a Test and Evaluation Strategy in support of that Milestone based on the concept of testing Evaluation Capability Modules (ECMs). An ECM is a "bundle" of various NCES services that provide improved capabilities to the warfighter/user. User priorities determine which services within that ECM "bundle" make up a given spiral.

The test strategy consists of a series of pilot and test phases on the ECMs until they achieve sufficient maturity. The Milestone Decision Authority must approve an ECM before it is operationally fielded. A multi-Service Test and Evaluation Working Group will begin development of the TEMP as soon as the program office identifies the first sets of ECMs and the capabilities documentation stabilizes.

The current focus is on developing the Capabilities Design Document. The program office intends to stand up a user's group consisting of members from key organizations in order to achieve continuous representation from the Services and Combatant Commands.

TEST AND EVALUATION ASSESSMENT

The NCES program is pursuing an aggressive schedule with a Milestone B approval in 4QFY05. TEMP development for Milestone B is in its very early stages. Immediate identification of ECMs and definition of capabilities is critical in order to meet this schedule.

The NCES program office intends to form a partnership with the National Security Agency and other programs using the NCES services prior to Milestone B. This partnership must provide a clear delineation of who is responsible for development of Information Assurance tools and capabilities. Synchronization of these developments is critical for effective NCES fielding.

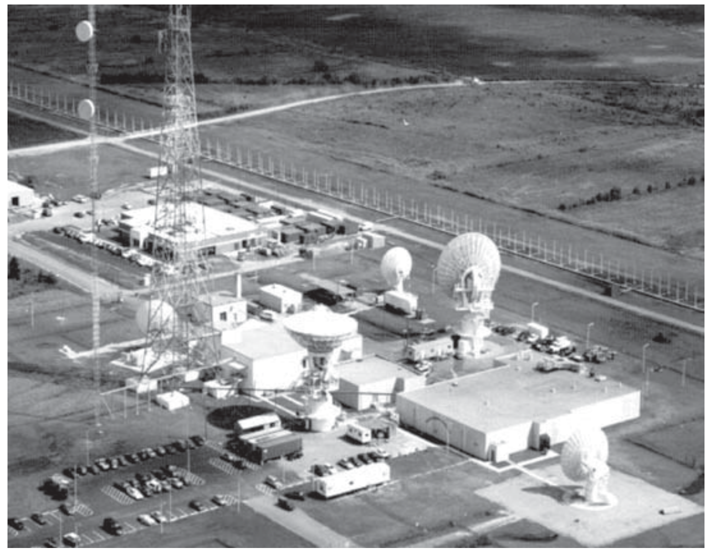
Development and testing will leverage the results and lessons learned from the Horizontal Fusion, Net-Centric Capabilities Demonstration, and Rapid Acquisition Incentive –Net-Centricity pilots.

The ability of NCES to support "tactical edge" users subject to their known bandwidth constraints is a significant concern. The program office must examine the feasibility of defining a sub-set of NCES capabilities that provide essential functionality, but take into account the restricted bandwidth with which the receiving users of the data or information live.

Teleport

SUMMARY

- Initial Operations Capabilities (IOC) 1 demonstrated X-band, Ku-band, and C-band connectivity at the Northwest Teleport site.
- Operational demonstrations provided data to evaluate IOC 1 at remaining Teleport sites.
- Limitations of legacy ultra high frequency radios for voice services and security issues accessing data services delayed IOC 2 testing.
- DOT&E approved the Test and Evaluation Master Plan for IOC 1 and Initial IOC 2 in July 2003. The Test and Evaluation Master Plan will be updated to address Generation 1-IOCs 3 and 4.



DoD Teleport system provides deployed satellite communications users access to defense information system network services and provides cross banding between different satellite communication systems.

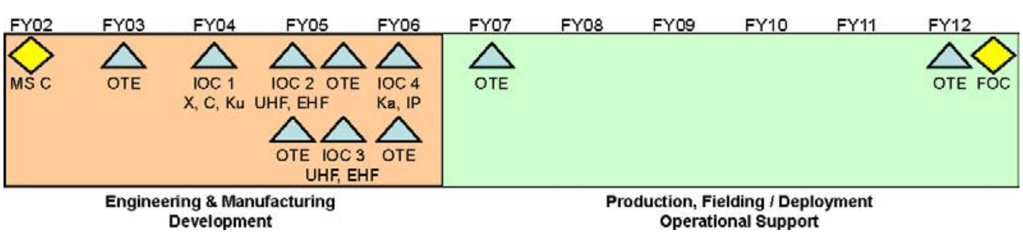
SYSTEM DESCRIPTION AND MISSION

The DoD Teleport system provides deployed satellite communications users access to defense information system network services and provides cross banding between different satellite communication systems. DoD established the Teleport program to satisfy the communications requirements and objectives specified in the Defense Information Service Network (DISN) Capstone Requirements Document. The Teleport directly supports the user requirements of worldwide coverage and connectivity, interoperability, responsiveness, and technology insertion. The Teleport system performs its mission from six core Teleport sites (Northwest, Virginia; Ramstein/Landstuhl, Germany; Lago Patria, Italy; Fort Buckner, Japan; Wahiawa, Hawaii; and Camp Roberts, California). The major command at each location operates and maintains the Teleport facilities.

The Teleport fielding plan uses a spiral acquisition process for three generations of the Teleport system.

- Generation One - IOC 1 provides upgraded X-band, C-band, and Ku-band capabilities and access to existing Standardized Tactical Entry Point sites in support of Army, Air Force, Marine, and Navy tactical and theatre level users. Generation One - IOC 2 provides ultra high frequency capabilities. Generation One - IOC 3 incorporates extremely high frequency. Generation One-IOC 4 provides limited military Ka-band satellite communications and internet protocol capabilities.
- The Generation Two Operational Requirements Document, approved July 2004, significantly redefined the fielding schedule. Generation Two expands military Ka-band and converged internet protocol capabilities.
- Generation Three provides full operational capability and incorporates future advanced military satellite communications.

TEST AND EVALUATION ACTIVITY



The Defense Information Systems Agency is the lead agency for system development and Joint Interoperability Test Command (JITC) is the operational test agency for the Teleport program. During 4QFY03, JITC and the operational test agencies conducted the Initial Operation Test and Evaluation (IOT&E) at the Northwest Teleport site in Virginia. The deployed users that participated in the IOT&E at the Northwest Teleport site included one ship, five Air Force terminals, one Marine Corps terminal, and two terminals at JITC. During the three-week event, the deployed users exchanged five of the six DISN services over X-band, C-band, and Ku-band and demonstrated operational utility over multiple hop, cross-banding, and hub-spoke configurations.

There is a standardized design for Teleport global network, but due to geographical location, relationship to combat commands, and personnel staffing, JITC will conduct an operational demonstration at each of the remaining five Teleport locations. The purpose of the operational demonstration is to test the site's ability to perform its mission once the new component is installed and to identify site-specific issues. During each of these limited tests, deployed users are required to access the various DISN services over various satellite configurations. The table below shows dates and locations deployed users accessed the Teleport network. During the tests, the message and call completion rates over the various configuration met user requirements.

Dates	Teleport Location	Deployed Users
27 Sept – 10 Oct 2003	Fort Buckner, Okinawa, Japan	Third Marine Expeditionary Force
13-22 Oct 2003	Wahiawa, Hawaii	U.S. Army Pacific Command
20-31 Oct 2003	Camp Roberts, California	McConnell Air Force Base, Kansas U.S. Army Pacific Command
13-24 Nov 2003	Ramstein Air Force Base, Germany	Sullivan Barracks, Germany
15-23 Mar 2004	Lago Patria, Italy	Ramstein Air Force Base, Germany Aviano Air Force Base, Italy

Developmental testing in support of the Generation One - IOC 2 identified problems that limit the degree to which deployed users can use Teleport ultra high frequency capabilities. Currently, when deploying ultra high frequencies, the multiple hop capability is the only Teleport configuration that users can access. The Teleport office is modifying the operational test schedule to address interim solutions for accessing data services through the Teleport ultra high frequency link.

TEST AND EVALUATION ASSESSMENT

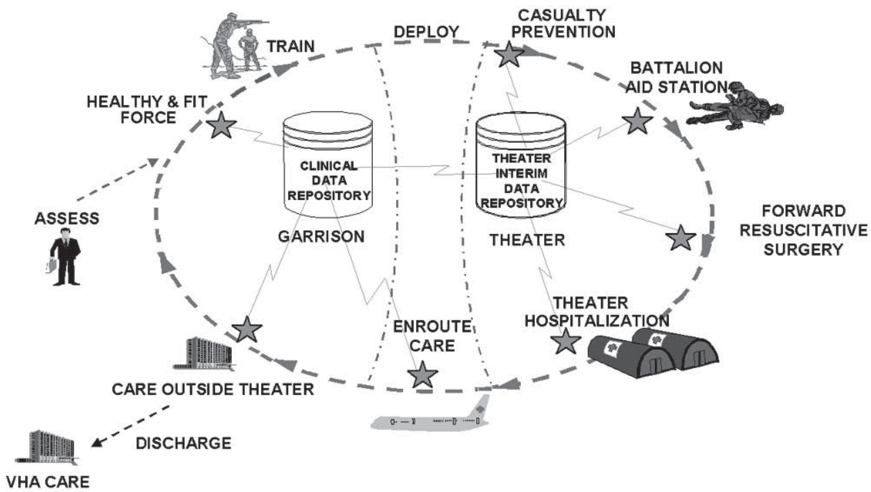
Generation One - IOC 1 capabilities are operationally effective and suitable, but fall short of the user's requirements. Future system testing will follow an evolutionary strategy for acquisition and fielding. The Teleport configurations demonstrated effectiveness in coverage, quality of service, and the ability to connect to five of the six DISN services. There were no operational suites available to test the connectivity into the Joint Worldwide Intelligence Communications System, which would account for the sixth service. The Joint Worldwide Intelligence Communications System has not been tested and will be demonstrated during future operational tests.

Testers were unable to observe all of the required management and control functions. Management and control functions will test in a follow-on test scheduled for 2QFY05. The National Security Agency's Red Team performed an information assurance assessment and concluded that the Defense Information Systems Agency Teleport system security posture is satisfactory. With the exception of interoperability using the Joint Worldwide Intelligence Communications System, there were several safety issues. The Generation One - IOC 1 system met all other suitability requirements.

The operational demonstrations conducted in FY04 at the five remaining Teleport sites confirmed the results observed during IOT&E at the Northwest Teleport site. Similar safety issues found at Northwest were observed at Fort Buckner and Wahiawa. Wahiawa and Fort Buckner personnel are correcting the safety shortfalls.

Theater Medical Information Program (TMIP)

SUMMARY



TMIP is a tri-Service medical information system that integrates information from existing systems and provides it to deployed medical forces.

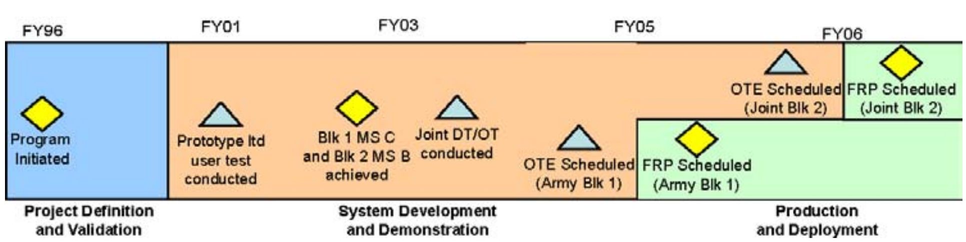
- All four Service operational test agencies conducted combined developmental/operational testing during 2003. The agencies tested the Theater Medical Information Program (TMIP) Block 1 in simulated operational environments. All of the applications worked and showed a positive functional trend over the months of testing. However, the software did not demonstrate adequate reliability and maturity at that time.
- The TMIP program office recently upgraded the operating system to *Windows 2000®*. We believe that this significantly increased the system's capability to achieve operational suitability.
- The Air Force conducted an operational assessment in a simulated operational environment in 4QFY04. Air Force operational testers are evaluating the results.

SYSTEM DESCRIPTION AND MISSION

TMIP is a tri-Service medical information system that integrates information from existing systems and provides it to deployed medical forces. It supports command and control, manpower and training, and medical functional areas. Areas include medical logistics, blood management, patient regulation and evacuation, and medical threat/intelligence. TMIP also supports health care delivery, medical capability assessment, and sustainment analysis.

The program office is developing TMIP in blocks and releases of increasing functionality and integration. TMIP Block 1 integrates information from existing medical systems. Examples include the Composite Health Care System (I and II), Defense Blood Standard System, and Defense Medical Logistics Standard Support. Future TMIP blocks will integrate other medical applications that have been developed for use during deployment. The Transportation Command Regulating and Command and Control Evacuation System is an example. The Services fund their own infrastructure (networks and communications). They also fund the computer hardware to host the TMIP software in a theater environment.

TEST AND EVALUATION ACTIVITY



DOT&E approved a Capstone Test and Evaluation Master Plan and a TMIP Block 1 Annex in April 2001, followed by approval of an updated version in October 2002. During 2001, the Army Test and Evaluation Command, the lead operational test agency, conducted a limited user test on a prototype version of TMIP Block 1 at Fort Sam Houston, Texas. Led by the Army, operational testers from all four Services assisted the program office in conducting combined developmental/operational testing in a simulated operational environment during March and April 2003. The event included typical users at Diego Garcia; Brooks Air Force Base, Texas; and Norfolk, Virginia. Army TMIP equipment and users were not available, having been deployed to Kuwait. Technicians at an Army laboratory site in Largo, Maryland, simulated Army users. Joint Forces Command simulated a joint task force headquarters in Portsmouth, Virginia. Testers and subject matter experts directed activities from a test operations center at Pacific Fleet headquarters in Pearl Harbor, Hawaii. Operational testers conducted another combined developmental/operational test during the summer of 2003. It included Army users at Fort Gordon, Georgia; Air Force users at Brooks Air Force Base, Texas; Navy users aboard two ships of the 7th Fleet; Marine Corps users in Okinawa; and a Joint Task Force headquarters simulated by Joint Forces Command.

In February 2004, DOT&E approved an Event Design Plan for the Air Force to use for operational testing. With some adaptation, the plan is comprehensive enough to be used by all the Services. In August 2004, the Air Force Operational Test and Evaluation Center conducted an operational assessment of TMIP Block 1 at Fort Detrick, Maryland, using a simulated field environment. The Air Force is still evaluating the results of that assessment.

Independent OT&E was not practicable during FY03 or FY04 due to the real world deployment of potential users and other factors. However, the Army Test and Evaluation Command plans to conduct OT&E of Block 1 for the Army in 2QFY05. Further OT&E will probably await the next software release, TMIP Block 2 Release 1. The program office plans to deliver the new release to the Services for preliminary test and evaluation in May 2005. The operational test community plans to conduct a joint OT&E of TMIP Block 2 Release 1 sometime between 1QFY06 and 3QFY06. They hope to conduct this test in conjunction with a joint exercise.

TEST AND EVALUATION ASSESSMENT

Developmental testing during 2003 showed that all of the planned TMIP Block 1 applications worked. Users received, processed, and displayed required information from multiple sources at a joint task force headquarters. The testers conducted the testing in a simulated user environment. They showed that computer systems aboard Navy ships could be adapted to use TMIP. They transmitted medical information to a fleet headquarters, which then forwarded it to a joint task force. Following the testing, the Navy retained its TMIP hardware and software for real world use aboard two Seventh Fleet ships and at Pacific Fleet headquarters. The Army currently uses TMIP Block 1 in Kuwait and Iraq.

The developmental testing in a simulated user environment was not strictly operational testing. However, the Service operational test agencies ran the test. The Army Test and Evaluation Command prepared a system assessment in November 2003. TMIP displayed a positive functional trend. In over 6,000 attempts, the success rate for critical mission functions climbed from 86 percent in March 2003 to 98 percent by August 2003.

TMIP has the potential to be operationally suitable. The one major exception was its reliance on an obsolete operating system, *Windows NT*®. During 2004, the program office upgraded TMIP to *Windows 2000*®. This should have significantly increased TMIP's potential to achieve operational suitability. Additionally, the TMIP software was not sufficiently mature or reliable. Installation and setup needed improvement and Service concepts of operation needed refinement. Testers will focus on these suitability areas during future OT&E. The testers did not gather enough data to demonstrate survivability. They need to do more testing of system backup and restoration. Also, field spot checks found several shortfalls in information assurance.

The results of the Air Force operational assessment should provide additional insight to the status of TMIP. We will further assess the system as soon as the Army is able to test Block 1. We will perform our primary assessment of TMIP upon completion of joint operational testing of Block 2.

Army Programs

Army Programs

Aerial Common Sensor (ACS)

The ACS will provide timely and accurate detection, threat identification, target tracking, and precision geolocation of highly mobile and moving targets.

SUMMARY

- The Army and Navy selected Lockheed Martin as the prime contractor for the Aerial Common Sensor (ACS) in 2004. The aircraft is a modified Embraer 145 regional jet.
- The ACS program passed Milestone B in 2004 and entered the System Development and Demonstration phase.
- With a selected prime contractor, the Army-only Test and Evaluation Master Plan requires updating to include Navy requirements and identify further testing requirements.

SYSTEM DESCRIPTION AND MISSION

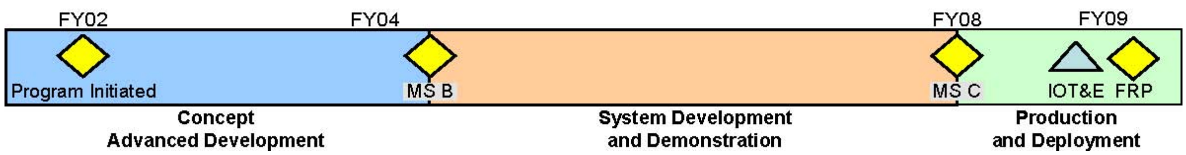
The ACS is an intelligence, surveillance, and reconnaissance system that was originally an Army program.

The ACS system consists of four major components:
- The aircraft
- The sensor payload
- The data link
- The processing capabilities in Army and Navy ground stations

The aircraft will be a modified Embraer 145 regional jet aircraft that is capable of worldwide deployment, ready to fight anywhere on the globe within 72 hours. The commercial off-the-shelf Embraer 145 will have significant modifications, including upgraded avionics, a 10-foot increase in wingspan, upgraded engines for increased thrust, and upgrades to increase the takeoff weight. The sensor payloads consist of multi-intelligence (MULTI-INT) systems that include a mix of sensors for signals intelligence, including communications intelligence, electronic intelligence, as well as imagery intelligence and electro optical/infrared sensors. The imagery intelligence sensors include synthetic aperture radar and moving target indicator radar modes. The data links include direct line-of-sight communications to ground stations within the theater of operations or satellite communications. They can send intelligence data back to a home station operations center within the United States, or to a secure rear area. The Distributed Common Ground System-Army and Distributed Common Ground Station-Navy will serve as the ground stations for the ACS aircraft. Much of the software required to process intelligence data from the ACS will be resident at the ground stations.

The ACS will replace the Army's current Guardrail Common Sensor and Airborne Reconnaissance-Low aircraft and the Navy's current EP-3E aircraft. The Army's Guardrail Command Sensor and Airborne Reconnaissance-Low aircraft fall short in meeting the requirement for deployment to a distant battlefield in a timely manner in advance of, or with, early entry forces. Replacement of the entire fleet of the Navy's aging EP-3 aircraft is required. The ACS will provide timely and accurate detection, threat identification, target tracking, and precision geolocation of highly mobile and moving targets. The ACS will support force protection, force maneuvers, targeting, and battle management operations.

TEST AND EVALUATION ACTIVITY



The ACS program completed a series of technology demonstrations in FY03. Two different contractor teams participated in the technology demonstration phase. Each contractor team set up a series of demonstrations in their systems integration labs to reduce the risk to the signals intelligence sensor design, MULTI-INT integration, and man-machine interface design. The contractors had to demonstrate their ability to meet key performance parameters and demonstrate mature system architecture. The government approved the plans for the demonstrations and then subsequently observed their execution. Data and other analyses supported a contract award to Lockheed Martin in FY04.

The ACS program completed an Army-only Test and Evaluation Master Plan in FY03 that lays out a robust test program. A series of developmental tests will verify the ACS has achieved its technical performance goals, including airworthiness certification of the aircraft and performance specifications for the various sensors. Force developmental tests and experimentation will focus on developing and refining the tactics, techniques, and procedures required to operate the system. The operational test phase will assess the ability of the ACS to accomplish its MULTI-INT, surveillance, and reconnaissance missions in support of a range of different operations.

The Navy will utilize a significant portion of the testing provided by the Army. The current Test and Evaluation Master Plan requires an update to include specific testing, which is unique to the Navy's requirements.

TEST AND EVALUATION ASSESSMENT

The technology demonstration phase conducted in FY03 allowed the Army and Navy to assess the technology readiness level of the signals intelligence and MULTI-INT portions of the ACS system. The technology was sufficiently mature to proceed to the System Development and Demonstration phase. The demonstrations also provided valuable information in selecting a system contractor.

Several issues need to be resolved to ensure successful execution of the ACS program. The ACS calls for the MULTI-INT integration of communications intelligence, electronic intelligence, imagery intelligence, and electro-optic/infrared sensors onto a single aircraft. This integration will be complex and will have to overcome the potential co-site interference between the different sensors. Processing the data from the different sensors will also require a system architecture that can prosecute MULTI-INT missions at both the aircraft and at the Distributed Common Ground System-Army and Distributed Common Ground Station-Navy ground stations. The ACS will also need to be interoperable and integrated with Joint Service networks to conduct joint operations with other Services. Concerns that still need to be resolved include size, weight, and power requirements necessary to carry and operate the MULTI-INT sensor payload and growth margin to add systems and capabilities in the future. Major changes to the commercially-flown Embraer 145 airframe will require significant systems development and integration. Assessing the impact of these changes on the performance of the aircraft will require significant testing.

AH-64D Longbow Apache

SUMMARY

- In recent combat deployments, the Longbow Apache helicopter confirmed the 1995 Initial Operational Test and Evaluation (IOT&E) assessment that the AH-64D helicopter provides effective air-to-ground combat power and, when engaged by small arms, the aircraft survives and provides protection for the crew.
- The Airworthiness and Flight Characteristics testing of Block I aircraft confirmed that the published performance charts for the AH-64D are in need of refinement.
- The Army completed a Preliminary Airworthiness Evaluation of Block II aircraft during FY04. The Army is planning for additional development and testing of Block II software and hardware.
- Army testing has found that Block II adds significant interoperability capabilities, but pilot workload inside the cockpit has increased.

As of August 2004, Boeing has delivered 367 AH-64D Longbow Apaches and scheduled 77 other airframes for conversion.

SYSTEM DESCRIPTION AND MISSION

The Army is remanufacturing and upgrading the AH-64A Apache helicopter into the AH-64D Longbow helicopter. The primary modifications to the Apache are the addition of a millimeter-wave Fire Control Radar (FCR) target acquisition system, the fire-and-forget Longbow Hellfire air-to-ground missile, upgraded T700-GE-701C engines, and a fully-integrated cockpit. In addition, the aircraft has improved survivability, communications, and navigation capabilities.

The Army is fielding the AH-64D in two configurations. The full-up AH-64D includes all of the improvements listed above. The other version of the AH-64D does not have the FCR, Radar Frequency Interferometer, or the improved engines. The AH-64D without FCR is more affordable, yet remains capable of employing Longbow Hellfire missiles autonomously or in cooperation with the FCR-equipped AH-64D. The Army acquisition strategy intends to upgrade 501 AH-64A Apaches in the fleet to the AH-64D configuration while equipping 227 aircraft with the FCR. This is an Acquisition Category IC program.

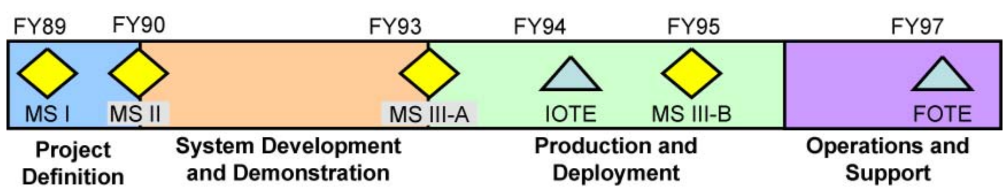
Due to operational needs, the Army is introducing the Combo-Pak internal auxiliary fuel system. The Combo-Pak consists of a 100 gallon, self-sealing, crashworthy fuel tank with a capacity for about 300 rounds of ammunition. The Combo-Pak replaces the baseline 1110 round ammunition package when installed.

As of August 2004, Boeing has delivered 367 AH-64D Longbow Apaches and scheduled 77 other airframes for conversion. The Army manages the conversion to AH-64D with a multi-year contract and considers production Lot 1 through Lot 6 as Block I aircraft. Block II aircraft begin with Lot 7 and include a Modernized Target Acquisition Designation System (M-TADS), upgraded processors, digital map, high frequency radio, and a digital data modem. The Army intends for the Block III configuration to have a significant increase in capability, as well as extending the service life of the current airframe. Planning is underway and funding committed to upgrade 284 current Block I aircraft out of the 501 AH-64D platforms to a Block III configuration. The Army plans to start fielding the Block III version in FY08.

During the past year, the Army deployed 50 AH-64A Apache and 128 AH-64D Longbow Apache aircraft to Afghanistan and Iraq. Both aircraft demonstrated remarkable survivability against enemy fire while conducting combat missions in harsh desert conditions. In spite of an intense operational tempo (37 flight hours per aircraft per month), both aircraft have maintained high mission capable rates. The mission-capable rate for the AH-64D Longbow Apache (0.84) was slightly higher than the mission capable rate for the AH-64A Apache (0.80).

The Army completed planned Live Fire Test and Evaluation (LFT&E) for the Longbow Apache in 1995, with the exception of the engine fire detection and suppression system test and the ballistic vulnerability testing of the new internal fuel and ammunition Combo-Pak. The Army initially deferred testing the fire detection and suppression system pending the expected introduction of a new Halon replacement, but will resume testing using Halon in FY05.

TEST AND EVALUATION ACTIVITY



Airworthiness and Flight Characteristics testing of Block I and Block II aircraft continued, but did not complete in FY04. The purpose of this testing is to accurately characterize the flight performance of all Longbow Apache aircraft.

The Army Aviation Test Directorate completed a Preliminary Airworthiness Evaluation of Block II aircraft in FY04. This testing supported evaluation of handling qualities, communications interoperability, and pilot workload of Block II aircraft. The Army has issued an airworthiness release and a conditional material release to support fielding of Block II aircraft.

The Army conducted technical testing of the Modernized Target Acquisition Designation System and the pilot's night vision sight at Yuma Proving Ground, Arizona, from January through March 2004.

The Army is currently preparing detailed test plans for the fire detection and suppression system and the Combo-Pak internal auxiliary fuel and ammunition system. The Army intends to use a fully-operational, though not flight-worthy, aircraft as the ground test vehicle for these tests.

TEST AND EVALUATION ASSESSMENT

The Airworthiness and Flight Characteristics testing of Block I aircraft confirms that the published performance charts for the AH-64D are in need of refinement. The Army is in the process of determining the magnitude and extent of the required changes. The Army reported no significant anomalies from the ongoing software regression testing.

DOT&E believes additional development and testing of Block II software and hardware is required. The Block II digital map display provides the potential for significant improvements in crew awareness of aircraft position and tactical situation. However, management of the display requires an excessive number of manual inputs, which forces the crew to have their heads down in the cockpit. The digital messaging capability is limited to low-volume air-to-air messages

between Block II aircraft. For instance, the Joint Variable Message Format Air Fire mission message does not work between the OH-58D Kiowa Warrior and AH-64D Lot 8 Longbow. The latency of digital messages, unrelated to voice communications, may sometimes be significant over both the Tactical Internet and the Fire Support protocals, but not readily apparent to the crew. Additionally, the airworthiness release for the aircraft states that present position and situational awareness icons should not be used to determine the disposition of friendly forces in a combat environment. This latent data will decrease confidence and situational awareness from both the aircrew and the air/ground commander's perspectives.

The Enhanced Position Location and Reporting System radio, fielded to one Longbow unit, assists with digital messaging, but also adds the potential for compromise of communications security during emergency shutdown. The improved image quality of the M-TADS/Pilot Night Vision System Forward Looking Infrareds will improve target acquisition and pilot capabilities. However, the Army must improve the Image Intensification sensor before it can be used to fly the aircraft safely. Additionally, the target tracker performance needs improvement and there is not yet enough data to estimate subsystem reliability.

The aircraft is currently operating with a Conditional Material Release (CMR). This CMR restricts full employment of the system for its intended use. With the exception of the Mission Display Processor reset problems, the Army has not corrected the deficiencies highlighted in the CMR in accordance with their "get well plan" for the system. The "get well plan" targeted September 30, 2004, as a completion date.

Army Battle Command System (ABCS)

SUMMARY

- The Army Battle Command System (ABCS) architecture and version 6.3D software deployed in Iraq and Afghanistan did not operate as an integrated system-of-systems.
- The ABCS version 6.4 introduces a new architecture to achieve better integration and data sharing.
- DOT&E considers the Army's ability to deliver fully functional ABCS version 6.4 software and a data sharing architecture in time to conduct an adequate operational test high risk.

ABCS is a system-of-systems that allows the combined arms commander to execute battle command at any echelon by providing a common operational picture of his battlespace.

SYSTEM DESCRIPTION AND MISSION

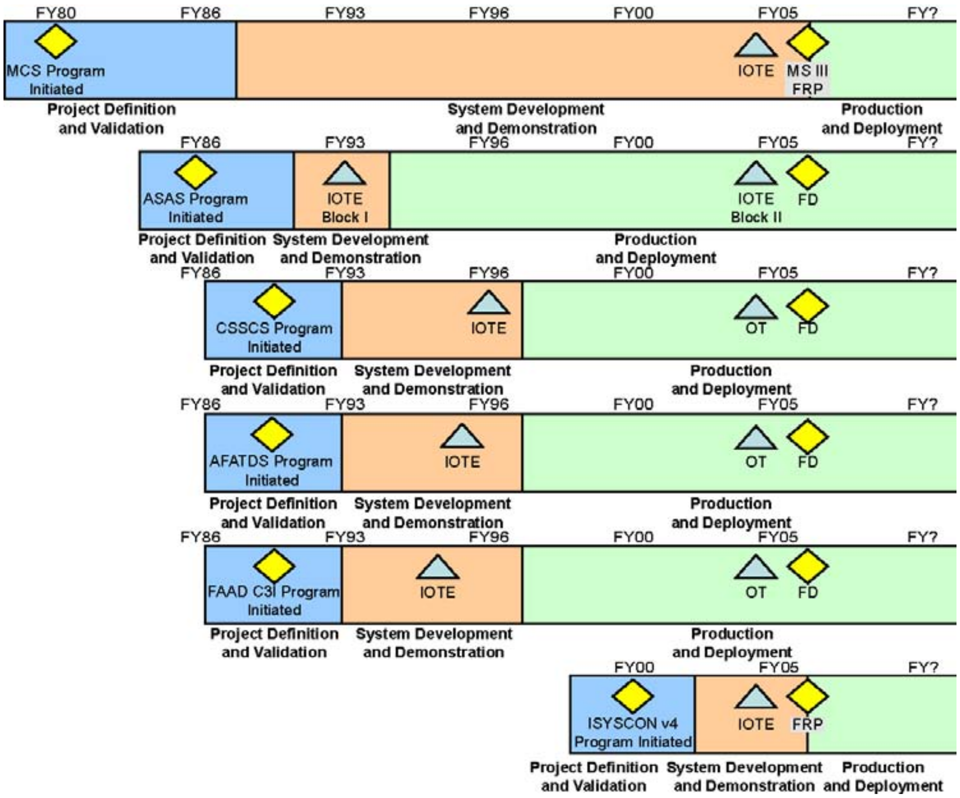
ABCS is a system-of-systems that allows the combined arms commander to execute battle command at any echelon by providing a common operational picture of his battlespace. A number of individual battlefield automation systems make up the ABCS. The key integrating systems are the Force XXI Battle Command Brigade and Below (FBCB2), the Maneuver Control System (MCS), and the Global Command and Control System-Army (GCCS-A). FBCB2 and GCCS-A are discussed in separate reports. This report covers the remaining ABCS systems on DOT&E oversight:

- MCS
- Battle Command Sustainment Support System (BCS3)
- All Source Analysis System (ASAS)
- Army Field Artillery Tactical Data System (AFATDS)
- Air and Missile Defense Planning and Control System (AMDPCS)
- Integrated System Control System (ISYSCON) Version 4

The ABCS programs follow evolutionary acquisition strategies as individual acquisition programs and are at various phases of acquisition. AFATDS, BCS3, and AMDPCS are beyond full-rate production with product improvements requiring testing to support material release decisions. The ASAS Block II, MCS, and ISYSCON require IOT&Es and full-rate production decision reviews. The Army plans to conduct a single test event to cover all the decisions necessary for ABCS 6.4 fielding.

In 2003, the Army Chief of Staff had all the ABCS Operational Requirements Documents revised to reflect a set of "Good Enough" capabilities. The "Good Enough" capabilities capture the experiences from recent operations and define the requirements for the next operational test.

TEST AND EVALUATION ACTIVITY



The Army Test and Evaluation Command conducted a system assessment of the ABCS Version 6.3D architecture supporting operations in Afghanistan and Iraq. The assessment team visited units deployed in theater to observe operations, interview users, and document system utility. The assessment, published in March 2004, reinforced the Army Chief of Staff review.

In response to the "Good Enough" review and the ABCS Version 6.3D assessment, the Program Executive Office developed the ABCS Version 6.4 architecture. Each of the ABCS program offices delivered the ABCS Version 6.4 software for their system to the Central Technical Support Facility at Fort Hood, Texas, for integration and testing in April 2004 as scheduled. Upon completion of integration testing, the system will begin Intra-Army Interoperability Certification Testing in October 2004 (postponed from July 2004).

AFATDS is the only system to conduct a separate test event this past year. A Limited User Test (LUT) in July 2004 examined capabilities specific to field artillery operations. The AFATDS test strategy requires the LUT and the ABCS event to support the AFATDS 6.4 material release decision.

The ABCS Test and Evaluation Integrated Product Team continues planning for the combined ABCS test event now scheduled for March 2005. This combined event will provide the venue to complete required operational testing and support decision reviews for the various ABCS components.

TEST AND EVALUATION ASSESSMENT

The ABCS architecture deployed in Iraq and Afghanistan did not operate as an integrated system-of-systems and did not provide the shared situational awareness described in the operational requirements documents. However, the separate ABCS components did provide individual capabilities and digital tools to support the commander. Various factors affected the integration of these components to include the communications architecture, training, and user/system interfaces.

The ABCS Version 6.4 introduces a new architecture to achieve the desired integration. This new architecture embodies the network centric concepts outlined by the Department of Defense and present in upgrades to the Global Information Grid. However, the schedule does not include sufficient time for technical integration and operational training. The ABCS Version 6.4 has been experiencing technical and integration challenges – delaying interoperability certification testing from July to October 2004. The delays increase the risk to the operational test event in March 2005.

Available resources also hamper planning for the ABCS operational test event, primarily the test unit (4th Infantry Division). The unit has competing priorities including unit modularization/restructuring, equipment modernization, and training for deployment - further complicating the ability to conduct an adequate test.

Based on these factors, DOT&E considers the ability to deliver a fully functional ABCS Version 6.4 architecture to deploying units and conduct an adequate operational test to support the many separate acquisition decisions high risk.

Bradley Fighting Vehicle System Upgrade A3

SUMMARY

- The Bradley Fighting Vehicle System (BFVS) Upgrade-A3 is in full production.
- Army and Program Manager are focused on maintaining wartime logistics readiness.
- There was no significant test and evaluation activity in 2004.
- Army will begin an extensive Bradley recapitalization effort to rebuild combat damaged vehicles and add future improvements, as Future Combat System (FCS) technologies will be integrated onto Bradley vehicles.

The M2A3 showed an improved level of operational effectiveness in the areas of detecting, identifying, and hitting targets when compared to the M2A2.

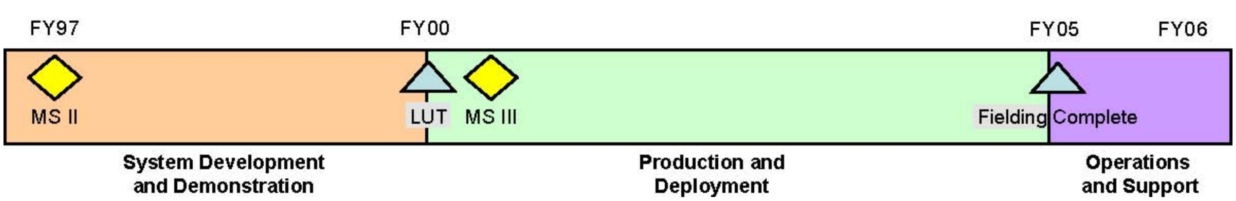
SYSTEM DESCRIPTION AND MISSION

The M2A3 and M3A3 BFVS are improved versions of the M2A2 and M3A2 BFVS, respectively. Enhancements on the BFVS-A3 improve lethality, mobility, survivability, and sustainability. Additionally, these enhancements provide increased situational awareness and digital command and control capabilities.

The BFVS is designed to provide mobile protected transport of an infantry squad to critical points on the battlefield. The BFVS is also used to perform cavalry scout missions. The BFVS provides overwatching fires in support of dismounted infantry and suppresses or defeats enemy tanks and other enemy fighting vehicles. BFVS-A3 upgrades include:

- Force XXI Battle Command Brigade and Below (FBCB2) integrated combat command and control. This system shares battle command information and provides situational awareness.
- Second generation Forward-Looking Infrared to enhance target acquisition and target engagement.
- A position navigation system with a Global Positioning System receiver and a backup inertial navigation system.
- An integrated maintenance diagnostics and built-in test equipment package.

TEST AND EVALUATION ACTIVITY



In March 1994, the Army began the engineering, manufacturing, and developmental phases. Previous operational testing included a Limited User Test (LUT) 1 in December 1997; an Operational Experiment in September 1998; a Detection, Acquisition, Recognition, Identification (DARI) Test in October 1998, and a LUT 2 in August- September 1999.

The M2A3 vulnerability evaluation was based on the full-up, system-level (FUSL) Live Fire Test and Evaluation (LFT&E); early M2A3 ballistic shock testing; electronic fault insertion events (controlled damage tests); and laser energy

weapon testing. The culminating LFT&E event was the FUSL test, conducted during the period of December 1998 through September 1999.

The Army conducted the BFVS-A3 Initial Operational Test and Evaluation (IOT&E) in October-November 2000 in accordance with a DOT&E-approved plan. DOT&E monitored test events and conducted an independent assessment of the test results and provided an Operational and LFT&E Report to the Secretary of Defense and Congress in April 2001.

In 2002 and 2003, the Army conducted several technical test events and demonstrations to evaluate fixes for FBCB2.

In 2004, the Army conducted a Driver Viewer Enhancer test.

TEST AND EVALUATION ASSESSMENT

DOT&E assessed the M2A3 to be operationally effective, suitable, and survivable based on the results of the IOT&E, DARI, and the LUT 2. The M2A3 showed an improved level of operational effectiveness in the areas of detecting, identifying, and hitting targets when compared to the M2A2. The M2A3 also has improved night fighting capabilities through its second generation Forward-Looking Infrared.

Field Test 5, conducted in September 2002, at the Electronic Proving Ground, Fort Huachuca, Arizona, and cold weather testing at the Cold Regions Test Center, Alaska, revealed significant suitability problems with M2A3 FBCB2 integration. Recent technical test results indicate that FBCB2 reliability significantly improved when using a new Solid State Hard Drive instead of the standard spinning FBCB2 hard drive. A 1,500 mile follow-on production test at Aberdeen Proving Ground, Maryland, confirmed the effectiveness and suitability of this solution.

In 2004, the Army conducted a test to evaluate the Driver’s Vision Enhancer. This report has not yet been submitted to DOT&E.

In 2005, the Army will begin an extensive Bradley recapitalization effort to rebuild combat damaged vehicles and add future improvements, as FCS technologies will be integrated onto Bradley vehicles.

CH-47F Improved Cargo Helicopter (ICH)

SUMMARY

- Navigational improvements associated with the new cockpit enhance mission effectiveness reduce pilot in-flight workload and instill confidence in the aircrews.
- As tested during Initial Operational Test (IOT) Phase I, the CH-47F did not attain threshold goals to improve system reliability by ten percent. However, the CH-47F is attaining reliability rates better than the CH-47D.
- As tested during IOT Phase I, the CH-47F did not demonstrate all digital interoperability capabilities required for Block 1 aircraft.
- The full-rate production decision, for approximately 39 Aircraft through Lot 5, will take place during 1QFY05.

The U.S. Army Test and Evaluation Command conducted IOT&E at Fort Campbell, Kentucky, from March 23 through May 6, 2004.

SYSTEM DESCRIPTION AND MISSION

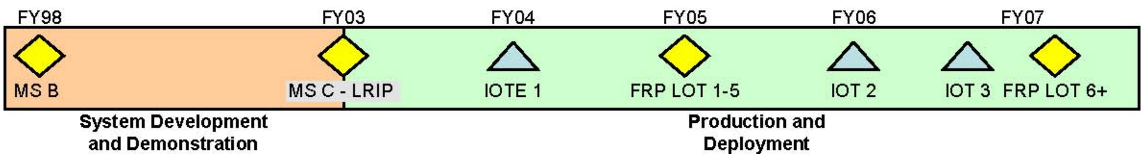
The CH-47F program is a rebuild of the current CH-47D helicopter with selected upgrades intended to extend service life and increase operational performance. The CH-47D is a twin-turbine tandem rotor helicopter designed for combat and combat support heavy-lift cargo missions. During this past year, senior Army leadership directed the Program Management Office to develop and integrate a new Common Avionics Architecture System cockpit and to initiate non-recurring engineering efforts to qualify monolithic machine airframe components on the aircraft as an additional effort to increase performance, increase reliability, and reduce operational and support costs. The prime contractor, Boeing, will build 55 new CH-47Fs and rebuild nearly 397 existing CH-47Fs.

The Office of the Secretary of Defense (OSD) approved entry into the engineering and manufacturing development (EMD) phase in FY98, based on perceived low-technical risk, and delegated Milestone decision Authority to the Army Acquisition Executive. The program has experienced delays, changes to the Operational Requirements Document, and production unit cost overruns due to rate increases and contractor cost estimates. An OSD Program Decision Memorandum, directing a program restructure in FY02, delayed the First Unit Equipped fielding of the CH-47F until FY07 to accommodate the MH-47G program. The Army Acquisition Executive's approval for the purchase of up to 30 low-rate initial production aircraft occurred on August 19, 2002. The Army completed the Initial Operational Test and Evaluation (IOT&E) in May 2004, and plans the full-rate production decision in early FY05 for the first 37 production CH-47F aircraft.

The Joint Requirements Oversight Council approved the updated Operational Requirements Document in March 2004. DOT&E approved the current Test and Evaluation Master Plan (TEMP) in January 2002. A TEMP update is in process with an expected approval date in early FY05.

DOT&E approved an alternative Live Fire Test and Evaluation (LFT&E) strategy in December 1997. USD (AT&L) approved the waiver and provided certification to Congress in March 1998. DOT&E approved the Army's LFT&E plan in January 1999.

TEST AND EVALUATION ACTIVITY



Two refurbished EMD aircraft completed 518 flight hours of reliability and maintainability testing in January 2004. Developmental test pilots conducted heavy-lift mission profiles and contractor maintenance personnel performed organizational-level maintenance. The Army conducted the majority of test flights in Alabama and included loading and unloading the aircraft with simulated mission cargo. This developmental testing provided estimates for reliability and maintainability of partially equipped aircraft in benign environments using highly qualified crews and maintainers.

The Army has an evolutionary acquisition/two block approach for meeting requirements. The Army plans to test and evaluate this two-block approach in three phases of operational test. IOT Phase I is complete and tested most Block I capabilities. IOT Phase II will take place using a low-rate initial production aircraft. This test will evaluate the capability of the CH-47F to meet Block I interoperability requirements not demonstrated in IOT Phase I and all Block II interoperability requirements. IOT Phase II will also test the new Common Avionics Architecture System cockpit and the new Digital Automatic Flight Control System. Phase III IOT will be conducted using the production representative monolithic airframe aircraft and test any other changes made to the aircraft prior to the fielding of the system to the first unit equipped in FY07.

The U.S. Army Test and Evaluation Command conducted IOT&E at Fort Campbell, Kentucky, from March 23 through May 6, 2004. Two CH-47F aircraft flew fifteen operational missions in 99 flight hours during the test. Mission types included air assault, resupply, movement of artillery and ammunition, and transport of ammunition and fuel. Fort Campbell pilots and maintainers, who recently returned from Afghanistan, conducted limited mission planning, structured mission briefs, mission execution, and unit-level maintenance in accordance with unit standard operating procedures.

The LFT&E program started in FY99. The Army used a production CH-47D aircraft as the LFT system-level ground test vehicle. The ground test vehicle was operational, though no longer flight worthy. The Army completed testing in FY04. The evaluation of test results is ongoing.

TEST AND EVALUATION ASSESSMENT

Analysis of CH-47D/F vibration and strain data indicates that both the CH- 47D and CH-47F model aircraft are experiencing structural fatigue damage. Developmental test results indicate that cockpit vibrations levels are lower in the cockpit area of the CH-47F than the CH-47D. However, similar but different vibrations in the aft cabin area for both type aircraft will continue to cause fatigue damage especially when flying in medium to high gross weight and high airspeed flight conditions. Stresses in the aft frames exceed design limits and fatigue damage will continue to occur when the aircraft conducts missions at medium or heavy gross weights. To address these issues, the program manager will incorporate monolithic airframes into all CH-47F aircraft beginning with the FY07 deliveries.

During developmental and operational testing, the CH-47F demonstrated the capability to self deploy and completed all required operational mission types with range and power to spare. Navigational improvements associated with the new cockpit enhance mission effectiveness reduces pilot in-flight workload and instills overall confidence in both pilots and crews.

During IOT&E Phase 1, the aircraft system did not meet program goals for a ten percent improvement in reliability. DOT&E also found the system did not demonstrate appropriate levels of digital interoperability. Reliability testing to date has confirmed that failures in the CH-47F are common to legacy CH-47D aircraft. IOT&E results indicate that the mean time between mission abort is 19.7 hours. The threshold requirement for mean time between mission aborts is 44 hours. Additionally, the demonstrated mean time between essential maintenance actions is 2.5 hours, while the threshold value is 3.3 hours.

The CH-47F program did not demonstrate that it has successfully integrated aircraft survivability equipment and communications enhancements. Electronic warfare testing concludes that the CH-47F, with its current aircraft survivability equipment suite of countermeasures, may be susceptible to attack. During IOT&E Phase I, radar and missile warning receivers had such a high false alarm rate that pilots habitually disabled the equipment, rendering themselves susceptible to any missile threat, had one existed. The Army plans to add the Common Missile Warning System to replace the legacy aircraft survivability equipment installed during IOT&E Phase I. This new system will require additional testing. Electromagnetic Interference testing as it relates to the Modified Engine Air Particle Separator and Aircraft Survivability Equipment identified additional concerns. The CH-47F did demonstrate the capability to send and receive selected digital messages between aircraft and with an obsolete tactical internet ground station in a sterile environment. The aircraft has yet to demonstrate a fully functional digital messaging capability that is interoperable with a ground-based tactical internet. Pilots were also not able to establish clear communications on all required secure and high frequency voice networks. The CH-47F did not meet the Interoperability Key Performance Parameter by demonstrating all Block 1 requirements during test. The Army plans to test the remaining Block 1 requirements and all Block 2 requirements for the Interoperability Key Performance Parameter during IOT Phase II.

Overall, the CH-47F LFT&E program was a robust program. Test data from the Army's LFT of the CH-47F, combined with the DOT&E's Joint Live Fire program test of the CH-47D, is adequate to evaluate the vulnerability of the CH-47F relative to the CH-47D. The results identified areas where vulnerability reduction features would be desirable. Premature loss of the ground test vehicle in an accident precluded dynamic testing of the rotor blades, fire detection/suppression system, and tunnel region. This somewhat limited the overall assessment. The vulnerability of these subsystems pertains to legacy design and does not contribute to addressing the primary issue of whether the CH-47F is any more vulnerable than the CH-47D. The test results and development of an overall vulnerability assessment are being evaluated. The program should plan to test these three areas when a suitable test article becomes available.

Chemical Demilitarization Program (CDP)

SUMMARY

- The Chemical Demilitarization Program (CDP) is composed of nine stockpile facilities and ten non-stockpile facilities and systems.
- **Anniston, Alabama.** Successful processing of sarin-filled M-55 rockets continues.
- **Umatilla, Utah.** Operational testing (OT) of sarin-filled M-55 rockets began in late FY04.
- **Pine Bluff, Arkansas.** OT for sarin-filled M-55 rockets begins in FY05. Arsenal Ton Container Destruction Facility OT indicated the current system was unable to process trace amounts of Lewisite. The system is undergoing developmental testing (DT) of potential solutions.
- **Aberdeen, Maryland.** Interruptions experienced in processing bulk mustard agent.
- **Newport, Indiana.** Controlled start-up of VX (nerve gas) agent operations planned for early FY04.

SYSTEM DESCRIPTION AND MISSION

CDP is an Army-managed program responsible for the destruction of the U.S. stockpile of lethal chemical agents and munitions, and non-stockpile chemical warfare materiel. This program is required to comply with the Chemical Weapons Convention, which is a major arms control and nonproliferation treaty that requires destruction of stockpile unitary chemical weapons by April 29, 2007.

The Chemical Stockpile Disposal Project is responsible for the development of the government-owned and contractor-operated chemical agent disposal facilities collocated with the nine chemical depots. Each site's prime contractor conducts all DT and OT under oversight of the Program Office and the U.S. Army Materiel Systems Analysis Activity. Five disposal facilities are employing the baseline chemical weapons disassembly and incineration process. The Johnston Atoll facility completed chemical agent disposal in November 2000, and closed in December 2003. The Tooele facility has been processing chemical agent since 1996. The Anniston and Umatilla disposal facilities began limited agent operations in August 2003 and September 2004, respectively. Pine Bluff plans to begin agent operations in January 2005.

The Army selected chemical neutralization of agents, followed by post-treatment of the neutralized products for the facilities at the two bulk agent storage sites in Aberdeen, Maryland, and Newport, Indiana. After September 11, 2001, options were pursued for accelerated destruction at the two bulk storage sites to reduce the risk of continuing agent storage. The Aberdeen disposal facility began limited agent operations in April 2003, with full-rate operation planned for December 2004. The Newport disposal facility is scheduled to begin limited agent operations in October 2004.

In 1996, at the direction of Congress, the Assembled Chemical Weapons Assessment Program was established to evaluate alternative technologies for the Pueblo and Blue Grass disposal facilities. In 2003, the Army awarded contracts to implement chemical neutralization of agents followed by post-treatment of the neutralized products as an alternative technology for the Pueblo and Blue Grass disposal facilities. The Pueblo and Blue Grass disposal facilities are in the design phase.

As of June, 2004, the disposal facilities had successfully destroyed approximately 29 percent of the total U.S. chemical weapons stockpile (originally 31,496 agent tons). The Army has met the first two Milestones of the Chemical Weapons Convention (1 percent and 20 percent destruction, respectively), but does not anticipate full destruction until April 2012.

The Non-Stockpile Chemical Materiel Project is responsible for the destruction of non-stockpile chemical warfare materiel, including the components of binary chemical weapons, miscellaneous chemical warfare materiel, recovered chemical weapons, former production facilities, and buried chemical warfare materiel.

TEST AND EVALUATION ACTIVITY

The test and evaluation program for each stockpile incineration disposal facility consists of DT, combined DT/OT, and dedicated OT phases. The DT phase consists of subsystem component testing. The DT/OT phase employs surrogate agents in all test events, culminating in trial burns of the furnaces and end-to end operations of the facility. The OT phase consists of agent trial burns and initial operations with agent. The OT is tailored to a specific agent/munition campaign. The OT will

support a decision whether to proceed to fully operational status for that specific agent/munition campaign. After completion of the campaign, the facility will revert to OT status for the next planned campaign. This process will repeat until destruction of all agent/munition configurations in the site's stockpile is complete.

For the two bulk agent storage sites implementing accelerated destruction, there is only a DT phase that culminates in end-to-end testing of the facility with surrogate agent, and an OT phase that consists of initial operations with agent. In implementing accelerated destruction at the Aberdeen and Newport sites, the program office has replaced the approved Test and Evaluation Master Plans for those sites with Test Concept Plans (TCPs). DOT&E has approved the TCPs for both the Aberdeen and Newport sites.

DOT&E monitors the test activity and independently analyzes test data for all stockpile facilities and non-stockpile systems. The test activity and test data support decisions on whether to proceed to the next test phase and determine readiness of either a stockpile facility to begin fully operational status or of a non-stockpile system to be operationally fielded at the conclusion of OT.

TEST AND EVALUATION ASSESSMENT

Army testing of stockpile and non-stockpile systems in the CDP has been adequate to ensure the safe and efficient disposal of chemical warfare materiel. The U.S. Army Materiel Systems Analysis Activity is providing effective independent oversight of the testing of both stockpile and non-stockpile programs. Their expertise and vigilance have resulted in the early identification and resolution of many of the problems discussed in the following paragraphs.

The implementation of accelerated destruction processes at the bulk storage sites increases the risk of safe operation of these facilities. This is due to increased manual handling of agent materiel and increased emphasis on maintaining program schedules. Emphasis on maintaining the program schedule at the Aberdeen facility led to a hastily conducted final DT prior to the start of OT. The problems found and subsequent delays during the OT can be attributed to the manner in which the DT was conducted. To date, the accelerated destruction process has not demonstrated the intended schedule and cost benefits. The Demonstration of Safe Operations at the Newport disposal facility took place from May through August of 2004. This series of events culminated with an Integrated Plant Run to demonstrate the ability of the facility and personnel to process agents and respond properly to contingency events. Testing uncovered several issues, all of which are expected to be resolved prior to the start of agent operations.

Single Chemical Agent Identification Set Access Neutralization System OT of the redesigned break pin assembly occurred in November 2003. The testing was successful and supported the December 2003 fielding decision.

The Explosive Destruction System (EDS)-2 DT/OT successfully completed in June 2004. The EDS-2 processed mustard, sarin, and phosgene in single, large, and multiple configurations. Conduct of this DT/OT was similar to a dedicated OT in that it used operational crews and procedures with a production representative system. Therefore, a dedicated OT phase was not conducted for EDS-2. Future FOT&E of EDS-2 is required for munition types and fills not tested during DT/OT. Based on concerns raised by us, all EDS variants now have a defined vessel-vacuum "go/no-go" criterion as part of their operating procedures that is based on past test data. This will reduce the risk of inadvertent agent release from the EDS vessel that could result if detonation occurs without a proper vessel seal.

The Large Items Transportable Accessing and Neutralization System OT began in March 2004 at Porton Down, United Kingdom. The program manager halted testing after serious performance issues were encountered, and the program has reverted to engineering development.

The Pine Bluff Arsenal Ton Container Destruction Facility began OT in September 2003. Following the neutralization process, several ton containers were still contaminated with residual lewisite. Therefore, the Army suspended the OT, and the system is now undergoing developmental testing of potential solutions.

Excalibur Family of Artillery Projectiles

Cannon artillery units will use Excalibur to provide close support to maneuver forces in urban or complex terrain.

SUMMARY

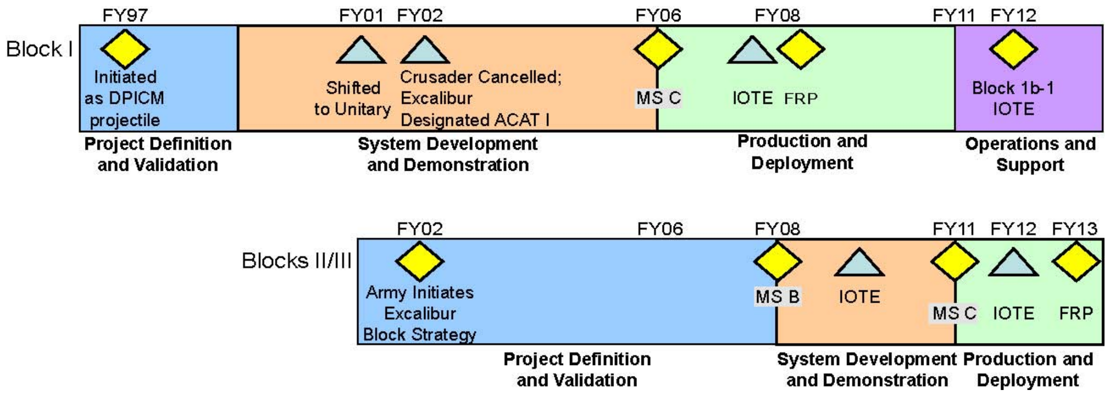
- The Army has not submitted an Excalibur Block I Test and Evaluation Master Plan (TEMP) to OSD for approval due to delays in approving the Operational Requirements Document (ORD) and Acquisition Program Baseline (APB).
- The Joint Requirements Oversight Council (JROC) approved the ORD on September 16, 2004, and the Army is developing the APB. DOT&E is working with the Excalibur Integrated Product Team to develop a Block I TEMP that integrates live fire, developmental, and operational test and evaluation.
- Integrated projectile testing began in September 2004.

SYSTEM DESCRIPTION AND MISSION

Excalibur is a family of precision-guided, extended-range artillery projectiles. Cannon artillery units will use Excalibur to provide close support to maneuver forces in urban or complex terrain. The Army is developing three variants of Excalibur within an evolutionary acquisition strategy. Block I consists of a high explosive, "unitary" munition. Block II will be a "smart" munition designed to search, detect, and engage moving and short-dwell targets. Block III will be a "discriminating" munition designed to distinguish specific target characteristics and selectively engage individual vehicular targets. All variants will employ advanced technologies, including Global Positioning System (GPS)-aided inertial guidance and navigation, to achieve increased accuracy and extended ranges beyond 30 km.

Block I (Unitary) will consist of three spiral fieldings of increasing capability. The Army intends to field the first spiral (1a-1) by 4QFY06. It will be an early fielding to Stryker Brigade Combat Team #5 (25^{th} Infantry Division), equipped with the M777A2 Joint Lightweight Howitzer. This projectile is required to have a circular error probability (CEP) of 20 meters and is not intended to be resistant to GPS jamming. M777A2, M109A6 Paladin, and Future Combat System (FCS) Non-Line-of-Sight Cannon units will fire the second spiral (1a-2). It must achieve a 30-meter CEP when the enemy applies GPS jamming as a countermeasure. It must attain a 20-meter CEP when not jammed. The Army will base its Milestone C and full-rate production decision for Block I upon the testing of this second spiral. The third spiral (1b) must achieve a 10-meter CEP when not jammed and a 20-meter CEP when jammed. The Army will conduct a separate Initial Operational Test and Evaluation (IOT&E) in FY12 for this projectile.

TEST AND EVALUATION ACTIVITY



Between March and July 2004, the contractor conducted multiple component and section level tests. During these tests, the projectile demonstrated stable airframe flight. The testing also verified the survivability and functioning of the improved canard cover retention system; the inertial measurement unit; the guidance and navigation unit; the tactical spinning base; and the live warhead. Finally, the testing demonstrated that the warhead could penetrate a concrete structure that meets objective requirements specified by the ORD. Live Fire Test and Evaluation (LFT&E) activities included arena and insensitive munitions testing of the unitary warhead.

The Army temporarily postponed Guided-Gunfire A, originally scheduled for September 2004, pending correction of two anomalies found during recent developmental testing. Guided Gunfire A will be the first flight that will evaluate the entire system's ability to acquire GPS and navigate to a designated target on the ground.

TEST AND EVALUATION ASSESSMENT

Excalibur must overcome several technical and integration challenges. Those challenges include achieving reliable fin and canard deployment, integrating the warhead and fuze, and gun-hardening the inertial measurement unit.

Previous efforts to field "smart" projectiles have been successful against benign targets, but have been less successful against targets that employ active and passive countermeasures. U.S. and Swedish program partners are working to make the technology more effective for Blocks II and III. To date, however, technology that discriminates between individual targets is unproven. The program office is examining options for future blocks that involve lower technical risk.

Additional effort is required to mitigate GPS jamming. If the enemy uses GPS jammers near the target, the Army expects Excalibur to use its inertial navigation system to hit the target. However, if jamming prevents initial GPS acquisition while in flight, the round will follow a ballistic trajectory instead of achieving guided flight. In that case, the round will "fail-safe" and will not detonate on impact. To further mitigate the risk to friendly forces and civilians, the firing solution will aim the howitzer at a designated "safe to discard" impact point on the ballistic trajectory.

Weapon accuracy required for engaging area targets should be achievable, but achieving the greater accuracy to attack structures and other point targets will be more difficult and involves higher risk. Additionally, Excalibur will require very accurate target location data in order to achieve the desired effects for the unitary variant. Target location errors will need to be 35 meters or less for personnel targets, and approximately 10 meters or less for targets requiring a direct hit.

Testing of XM982-Unitary munition developmental and operational testing fully integrates the LFT&E. The Army plans to conduct gun-fired lethality testing during developmental testing using a "Live Fire Target Array" consisting of mixed personnel and light materiel targets. Structures will be attacked that are representative of expected threat targets. The Army will complete warhead technical testing and some gun-fire testing in time to support a Milestone C decision in 4QFY06.

Force XXI Battle Command, Brigade and Below/Blue Force Tracker (FBCB2/BFT) Block I

FBCB2's capabilities enhanced battlefield visualization, situational awareness, navigation, and battle command.

SUMMARY

- The Army cancelled the Initial Operation Test and Evaluation (IOT&E) in 2003 because the test unit deployed in support of Operation Iraqi Freedom and Operation Enduring Freedom.
- DOT&E approved the Army's plan to use the following events to constitute an IOT&E in support of a full-rate production review:
  - Limited User Test-2A (2001)
  - Operation Iraqi Freedom/ Operation Enduring Freedom (January 2004)
  - Developmental test/ operational test (February 2004)
- The Force XXI Battle Command, Brigade and Below (FBCB2) system is operationally effective and suitable, but demonstrated reliability well short of the user defined requirements.
- The FBCB2/Blue Force Tracker Test and Evaluation Master Plan, approved in August 2004, is adequate to evaluate shortcomings identified in the IOT&E and for evaluation of FBCB2/BFT Block II requirements.

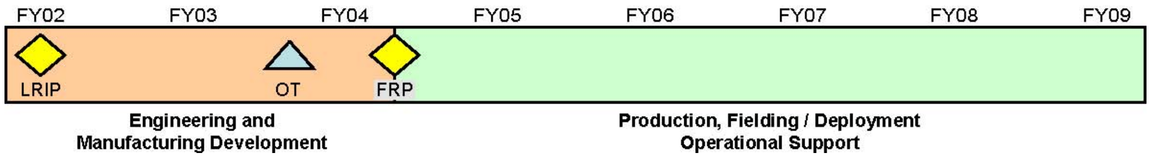
SYSTEM DESCRIPTION AND MISSION

The FBCB2 system is designed to provide timely, accurate, and on-the-move command and control information to Army and Marine Corps forces at brigade levels down to individual platforms. FBCB2/BFT displays, on a computer screen, the positions of the Army or Marine Corps vehicles that have similar equipment and allows units to exchange orders, graphics, reports, and free-text messages. FBCB2/BFT uses satellite communications to transmit the information between units and Global Positioning System receivers to determine the position of the unit. An earlier configuration of FBCB2/BFT uses non-satellite terrestrial radios Single Channel Ground and Airborne and Enhanced Position Location Radio Systems (SINCGARS and EPLRS) to communicate.

FBCB2/BFT program consists of an integrated suit of hardware, system and application software, and support system. FBCB2/BFT systems are installed on various weapons platforms, combat vehicle, and at battalion and brigade tactical operational centers. There are three FBCB2/BFT configurations. The first configuration is an appliqué computer system, consisting of a central processing unit, touch screen display, and keyboard. This system uses SINCGARS and EPLRS radio line-of-sight means of communications. This system is cleared to transmit classified data up to the secret level. The second configuration is an embedded system and it uses the weapons platforms existing processor and EPLRS and SINCGARS radios. It can also transmit up to secret.

The third configuration is a satellite system referred to as Blue Force Tracker. It uses satellite communication and is a non-secure system.

TEST AND EVALUATION ACTIVITY



The IOT&E was scheduled for 2003, but the test unit was deployed to Operation Iraqi Freedom and Operation Enduring Freedom, and the IOT&E was cancelled. The Army and DOT&E sent a team to Iraq and Afghanistan to assess operational performance and determine system functionality in an operational wartime environment. The team conducted surveys and interviews and reviewed action reports and gather personal observations with users in units operating FBCB2/BFT system. Information revealed that situational awareness was an invaluable tool used by the commanders during the war for battle synchronization and battlefield visualization. Soldiers praised the capability to maintain communications with other vehicles over distances too great for terrestrial communications systems. BFT messaging capability reduced voice traffic and allowed commanders to focus on command and control and spend less time requesting position reports.

The Army conducted a developmental test/operational test (DT/OT) during February 19-27, 2004. The FBCB2/BFT DT/OT was a distributed test conducted at the United States Army Electronic Proving Ground, Fort Huachuca, Arizona; the Central Technical Support Facility, Fort Hood, Texas; and Fort Bragg, North Carolina. The DT/OT was largely a technical test with the primary objective of the test to characterize the ability of the system to exchange situational awareness and entity data between satellite and terrestrial networks. The test included 30 platforms, 25 BFT systems and 5 terrestrial FBCB2s installed in High Mobility Multipurpose Wheeled Vehicles, commercial utility cargo vehicles, and cargo trailers. Soldiers participated in the test and operated each system.

TEST AND EVALUATION ASSESSMENT

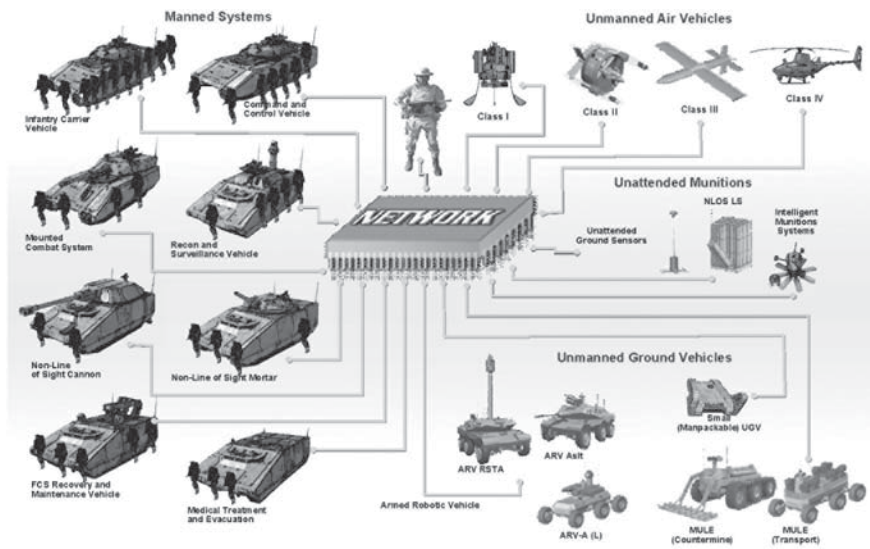
FBCB2 is operationally effective and operationally suitable. Reliability fell well short of user requirements. Commanders, leaders, and soldier feedback from Operation Iraqi Freedom and Operation Enduring Freedom played a major role in determining effectiveness and suitability of the FBCB2 system. FBCB2 provided a limited capability for which it was designed. FBCB2's capabilities enhanced battlefield visualization, situational awareness, navigation, and battle command. The mean time between essential function failure requirement is 500 hours, and testing revealed 346 hours without peripheral devices (i.e. radios/interface devices). The system's mean time between essential function failures averages between 96-113 hours with government furnished equipment included. Although the system did not demonstrate its mean time between essential function failure requirements, the shortfalls were often mitigated due to redundant systems. Without the government furnished equipment, FBCB2 would not have operational capability.

Many of these shortcomings were attributable to the expedited fielding to support Operation Iraqi Freedom and Operation Enduring Freedom. The FBCB2 program must address these shortcomings and verify their fixes in future operational test and evaluation events.

Future Combat System (FCS)

SUMMARY

- The Future Combat System (FCS) Increment I consists of 18 systems and the network (18+1). The systems include:
  - Unattended ground sensors
  - Two unattended munitions:
    - Non-Line of Sight – Launch System
    - Intelligent Munitions System
  - Four classes of unmanned aerial vehicles organic to platoon, company, battalion, and the Unit of Action
  - Three classes of unmanned ground vehicles:
    - Armed Robotic Vehicle
    - Small Unmanned Ground Vehicle
    - Multifunctional Utility/Logistics and Equipment Vehicle
  - Eight manned ground vehicles
- The Army recently restructured the FCS program so that it will produce capabilities in four spirals.
- The Army is currently revising the FCS Milestone B Test and Evaluation Master Plan (TEMP) to accommodate program restructuring.

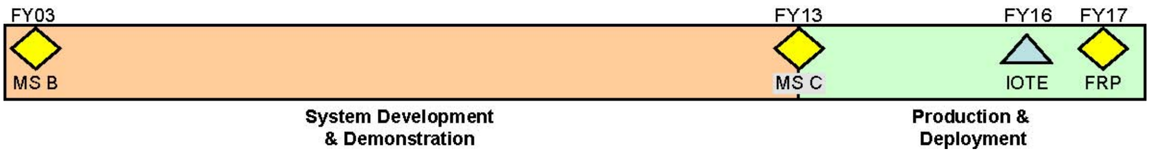


The FCS is composed of a family of networked air and ground based maneuver, maneuver support, and sustainment systems that will include manned and unmanned platforms.

SYSTEM DESCRIPTION AND MISSION

The FCS is composed of a family of networked air and ground based maneuver, maneuver support, and sustainment systems that will include manned and unmanned (MUM) platforms. FCS is networked via a Command, Control, Communications, and Computers, Intelligence, Surveillance, and Reconnaissance (C4ISR) architecture that include networked communications, network operations, sensors, battle command system, and MUM reconnaissance and surveillance capabilities. FCS will operate as a system-of-systems that will network existing systems, systems under development, and systems yet to be developed. FCS provides force capability that will improve intelligence, surveillance, and reconnaissance, enhance analytical tools, provide Joint Service exchange of friendly and enemy force tracking down to the tactical level, battle command, real time sensor-shooter linkages, and increase synergy between echelons and within small units. FCS will enable the networked combat unit of action (UA) to develop the situation in and out of contact, set conditions, maneuver to positions of advantage, and close with and destroy the enemy through standoff attack and combat assault.

TEST AND EVALUATION ACTIVITIES



The TEMP was approved on April 25, 2003, and will be updated in FY05 to reflect program restructuring. A single TEMP will guide all developmental and operational testing. FCS TEMP Annexes will cover Spiral Out testing. FCS platforms will be tested and evaluated individually. The Army plans to designate a brigade as the "Evaluation Brigade Combat Team." Plans call for this unit to conduct operational testing for each of the four Spiral Out packages. The precise details on the number, timing, and scope of test events are still being developed.

Operational testing for the FCS UA will begin with a series of four Limited User Tests beginning in FY11. The Initial Operational Test and Evaluation (IOT&E) will occur in FY15. FCS Live Fire Test and Evaluation will be complete before the full-rate production decision, scheduled in FY16.

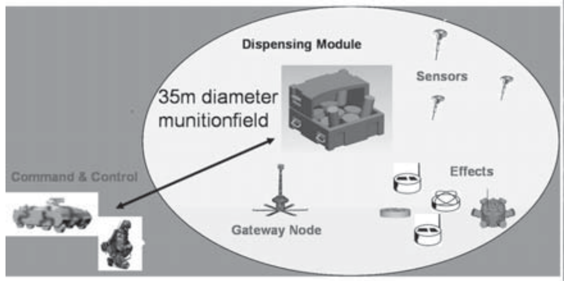
TEST AND EVALUATION ASSESSMENT

Restructuring the FCS program should help mitigate the risks associated with such an ambitious program scale and schedule. The test and evaluation methodology changed from a "big bang" approach to a "build a little, test a little" approach. While this new iterative strategy accelerates select FCS capabilities to the current Force, these incremental improvements will need to be tested and evaluated in both the Evaluation Brigade Combat Team and the current Force units receiving this equipment. In addition, the Army's FCS concept rests upon a network of sensors, platforms, and command nodes linked by reliable high-bandwidth and high-speed communications – all capabilities that do not yet exist. Finally, advanced modeling and simulation is expected to support both the execution of live operational testing and FCS ballistic survivability evaluations. In order for modeling and simulation to be useful in assessing overall effectiveness, suitability, and survivability, the FCS test program will need to balance modeling and simulation with physical testing to support the FCS evaluation.

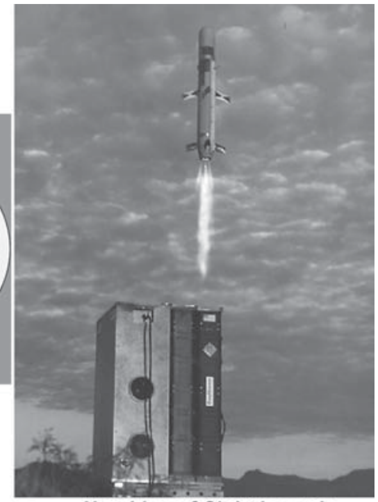
Future Combat System (FCS) Munitions

SUMMARY

- In July 2004, the Army announced a restructuring of the Future Combat System (FCS) program. That restructuring included fielding FCS capabilities in four "spirals" between FY08 and FY14.
- Non-Line-of-Sight Launch System (NLOS-LS) and Intelligent Munitions System (IMS) are the "unattended munitions" portion of the FCS program.
- The Army intends to field NLOS-LS and IMS in FY08 and FY09, respectively, with the first FCS spiral.
- The Army will revise the FCS Test and Evaluation Master Plan (TEMP) based upon the program's restructuring. We anticipate that the Army will submit the revised TEMP to OSD for approval by 3QFY05.



Intelligent Munitions System (IMS)



Non-Line-of-Sight Launch System (NLOS LS)

NLOS-LS is a family of precision-guided missiles launched from a "box" – the container/launch unit. IMS is an integrated system of unattended ground sensors linked to other lethal and non-lethal weapons systems via the Army Battle Command Network.

SYSTEM DESCRIPTIONS AND MISSIONS

Non-Line of Sight-Launch System (NLOS-LS)

NLOS-LS is a family of precision-guided missiles launched from a "box" – the container/launch unit (C/LU). The C/LU weighs approximately 3000 pounds and holds 15 missiles. It has an onboard navigation system for self-location and embedded fire control capabilities for remote, unmanned operations. Soldiers can fire it from a variety of vehicles or from the ground. NLOS-LS consists of two missile variants, the Precision Attack Munition (PAM) and the Loiter Attack Munition (LAM). The Army intends for PAM to attack point targets (moving and stationary) such as tanks, armored troop carriers, lightly fortified bunkers, and personnel. It will use infrared and semi-active laser sensors to guide to the targets. The Army plans for LAM to loiter over a target area, providing target information, as well as attack high payoff targets. LAM uses a laser radar sensor and can send images over the FCS network to aid operators in selecting targets. In addition, LAM will have the capability to select and attack targets autonomously.

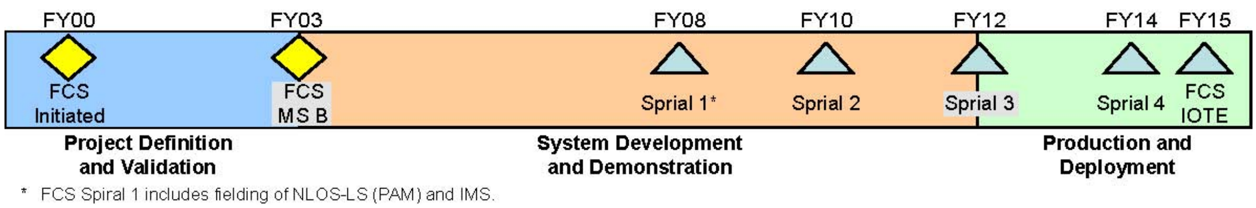
Only NLOS-LS PAM will be part of the FCS Spiral 1 that the Army plans to field in FY08.

Intelligent Munitions System (IMS)

IMS is an integrated system of unattended ground sensors linked to other lethal and non-lethal weapons systems via the Army Battle Command Network. The Army plans for IMS to help see and understand enemy and non-combatant activities and then preclude enemy elements from interfering with friendly operations. The Army intends for IMS to achieve three objectives. First, IMS will over watch areas of interest and provide continuous surveillance to develop the common operating picture. Second, it will detect and engage a variety of personnel and vehicular targets with lethal and non-lethal munitions. Third, it will cue other systems to attack targets with networked fires and other munitions.

The Army is developing IMS within an evolutionary acquisition process. The Army will field Increment 1 beginning in FY09 to support the current force and to comply with the National Landmine Policy. Soldiers will hand emplace an Increment 1 module that can dispense IMS sensor and effects components upon command. Soldiers can also hand-emplace the individual sensor and effects components for precise emplacement. The Army intends to emplace Increment 2 components out to 15 km via rockets, fixed-wing, rotary-wing, or unmanned aerial vehicles. The Army plans to field IMS Increment 2 with FCS Spiral 4 by FY14.

TEST AND EVALUATION ACTIVITY



Non-Line of Sight-Launch System (NLOS-LS)
NLOS-LS was a Defense Advanced Research Projects Agency (DARPA) program until FY03. DARPA conducted several successful flight tests of a PAM prototype system. The Army plans to change the design to incorporate the warhead and to make other improvements to meet threshold requirements. LAM's performance was less successful, but resulted in the understanding of technical limitations that the developer plans to address in future designs. The Army awarded a six-year system development and demonstration contract to the Netfires Limited Liability Company in March 2004. Before the FCS program restructure, the Army planned to begin the major test events for NLOS-LS in FY07. The Army will need to accelerate some test events to meet the new FCS schedule.

Intelligent Munitions System (IMS)
The Army awarded 27-month technology development contracts to two contractors in April 2003. During FY04, each contractor provided the Army with Effects and Delivery Trade Studies and Increment Strategy Analysis Reports. The two contractors reported to the Army on the development and testing of component prototypes at quarterly program review meetings. These technology development efforts will culminate with a government conducted prototype assessment test in May and June 2005. Based on the results of this test, the Army will conduct a Milestone B decision review in August 2005 and then select between the two technology development contractors to complete the development. The program manager has formed an integrated process team to develop the Live Fire Test and Evaluation strategy for the Milestone B TEMP.

TEST AND EVALUATION ASSESSMENT

We expect that the Army will submit the revised FCS TEMP for our approval by 2QFY05. This TEMP will include additional details for the live fire and operational testing of NLOS-LS and IMS.

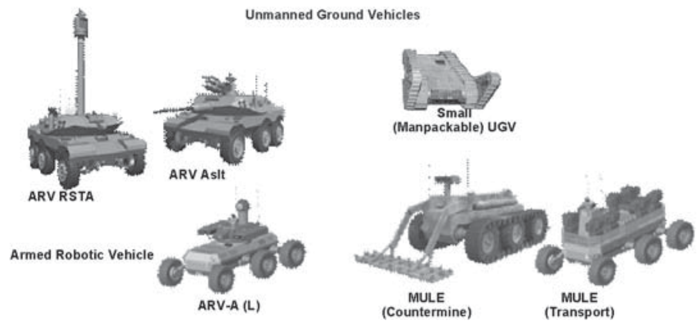
Non-Line of Sight-Launch System (NLOS-LS)
Although NLOS-LS PAM has completed some early prototype testing, it still has some technical challenges to overcome. In addition, the extent to which the FCS network will be available in FY08 is still to be determined. Once that availability is determined, the Army will have to demonstrate the capabilities PAM can deliver and conduct technical and operational tests to demonstrate operational effectiveness and suitability of the system.

Intelligent Munitions System (IMS)
Both contractors have reported that their developmental efforts are on schedule to provide the hardware, software, and data required for the prototype assessment test. The Army has developed an acceptable test and evaluation strategy to guide its assessment of the contractor prototypes before the scheduled Milestone B decision. The Army Materiel Systems Analysis Activity has begun work on verification and validation of modeling and simulation tools to assist in the analysis of each contractor's proposed system in support of the Milestone B decision.

Future Combat Systems Unmanned Ground Vehicles (UGVs)

SUMMARY

- Unmanned Ground Vehicle (UGV) prototypes will not be available for testing until FY08-FY09.
- Experiments by the Army Research Lab to assess mobility technologies show that current UGVs can travel cross-country at only one-forth the speed of manned vehicles.
- During FY04, the Defense Advanced Research Projects Agency (DARPA) funded the Grand Challenge cross-country race to assess mobility technologies. No vehicle completed more than 8 miles of the 142-mile course.
- The Army must develop and refine the Concept of Operations and technology for mobility, tactical behaviors, and command and control.



The UGVs within the Future Combat System program consist of three categories or classes: Class I – light vehicles, Class II – medium vehicles, and Class III – heavy vehicles.

SYSTEM DESCRIPTION AND MISSION

The UGVs within the Future Combat System (FCS) program consist of three categories or classes: Class I – light vehicles, Class II – medium vehicles, and Class III – heavy vehicles. The Class I system is the Soldier UGV (SUGV). These robots typically weigh about 30 pounds and will be carried in a soldier's backpack. This class of UGVs may have up to 10 inter-changeable payloads (e.g., mine detection, Reconnaissance, Surveillance, and Target Acquisition (RSTA), Explosive Ordnance Disposal (EOD) removal). The Army plans to produce up to 1,215 SUGVs at a projected cost of approximately $30K per system.

There are four systems in Class II, all of which are based on the Multi-function Utility/Logistics and Equipment (MULE) chassis. These include the MULE Transport (MULE-T), MULE Countermine (MULE-CM), MULE Retrans for relay of communications, and the Armed Robotic Vehicle-Assault (Light) (ARV-A L). These robots will weigh 5,000-7,000 pounds, and will operate with dismounted troops. The ARV-AL will carry two Javelin missiles and a .50 Caliber machine gun. The other utility vehicles will be equipped with appropriate sensors for various missions. The Army plans to produce approximately 1,200 MULES, with approximately 300 designated for the assault configurations, and the remainder as transport, communications, or countermine systems.

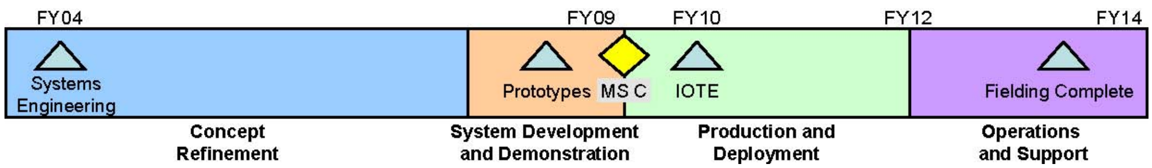
The two systems in Class III are the ARV-Assault and the ARV-RSTA, expected to be 10,000-20,000 pound vehicles, measuring about 12 feet in length. The Army plans to arm the ARV-A with four Javelins (or Joint Common Missiles) and a 30mm gun. The ARV-RSTA will have a suite of surveillance payloads. Both configurations are to be CH-47 sling-loadable and air-droppable from a C-130 aircraft. The Army plans to procure a total of 675 of these systems for the FCS program, at a cost of approximately $5M each for the basic platforms, not including weapons and payloads.

The Army initially deferred Class III systems from FCS Increment I because of affordability. Class III UGVs were moved forward into Spiral 1 as part of the Army's acceleration strategy. The current schedule calls for these systems to remain in the Science and Technology phase as a DARPA/Army program through 2006. The Class III systems may enter System Development and Demonstration after FY06.

In addition to the individual UGV developments, there is a separate development program for a shared Autonomous Navigation System (ANS) for use by all classes of UGVs. ANS will consist of a Laser Detection and Ranging and a camera, which together make up the Laser Detection and Ranging Image Processing Module.

In support of a rapid fielding request from U.S. Central Command for an EOD capability in Iraq and Afghanistan, three vendors deployed systems into that theater. These were the Vanguard Talon, Packbot Matilda, and the Mini-Andros. System assessments of their performance are on going.

TEST AND EVALUATION ACTIVITY



There has been no testing of full-up prototypes, as these systems are not expected to be available until the FY08-FY09 timeframe. Instead, in recent years there have been several low-level research efforts directed at particular aspects of the UGV development problem. During 2002 and 2003, the U.S. Army Research Laboratory (ARL) conducted experiments to assess the maturity of autonomous mobility technologies of FCS Block I ARV concepts using experimental unmanned vehicles as surrogates. These experiments were designed to address two key issues:

- The level of maturity of currently available autonomous mobility technology.
- The cognitive workload placed on the operator directly controlling the vehicle.

Results indicate that with current technology, UGVs can successfully navigate over various deserts and snow covered courses, but require manual intervention approximately once every 2 kms or roughly every 20 minutes. Data from these tests show current UGVs are only capable of traveling cross-country during the day at one-fourth the speed of manned vehicles.

TEST AND EVALUATION ASSESSMENT

The Army's developmental testing and field experience indicate that, while small semi-automous vehicles (e.g., Packbots in Iraq) have demonstrated some capability, the larger vehicles have considerable challenges to overcome to become viable. The Class I SUGVs have had successes in Iraq and Afghanistan in exploring caves and in EOD, and the FCS program identified them as the "easy" class among the three UGV families. Major issues with this class relate more to operational concepts (e.g., ownership and transport of up to 10 interchangeable payloads) than to technological developments. For Class II and Class III UGVs, technology for mobility to keep up with troops – mounted and dismounted – over rugged, diverse terrain remains the most overarching challenge as demonstrated in ARL experiments and the DARPA sponsored Grand Challenge. Tactical 'behaviors' in unexpected situations (e.g., how to escape, actions when systems loses communications, situational awareness to avoid fratricide), remain technological challenges. Concepts or methodologies to tests such technical capabilities once they are developed remain challenges for the test community.

Global Combat Support System - Army (GCSS-A)

SUMMARY

- In January 2004, the Global Combat Support System-Army (GCSS) entered the Blueprinting (engineering) phase of Enterprise Resource Planning (ERP) development.
- ERP is a software engineered process that streamlines operations and management.
- In June 2004, the Defense Acquisition Executive (DAE) approved the recommendation to consolidate GCSS-Army and the Product Lifecycle Management Plus (PLM+) as one Acquisition Category ID program.
- The consolidated program will have a single Program Manager, but separate funding lines for GCSS-A and PLM+.
- The Milestone B decision review is expected at the completion of the Blueprinting phase in 3QFY05.

The decision to adopt an enterprise resource process requires significant change to Army-wide logistics policy, regulation, doctrine, and tactics, techniques, and procedures.

SYSTEM DESCRIPTION AND MISSION

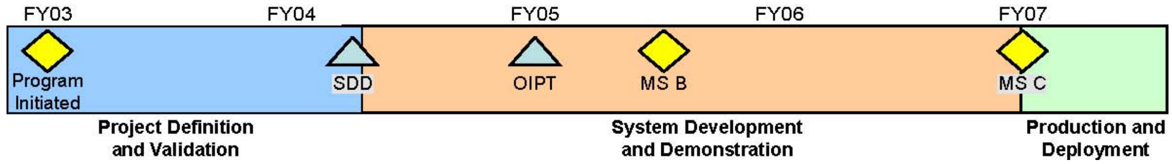
The GCSS-A is a restructured Major Defense Acquisition Program, Acquisition Category ID program. The GCSS-A is a major program in the Army's Combat Support/Combat Service Support transformation. GCSS-A will be implemented from the Major Command down to the tactical units. The GCSS-A program has two components: a functional component titled GCSS-A (Field /Tactical), and a technology enabler component titled Product Lifecycle Management Plus (PLM+). GCSS-A modernized the current tactical logistics Standard Army Management Information Systems to incorporate logistic management modules using common operating systems and graphic user interface.

GCSS-A will help Army commanders anticipate, allocate, and synchronize the flow of Combat Service Support resources. Integrating total asset visibility will allow a better matching of supply to demand, resulting in fewer supplies and less equipment requiring movement. GCSS-A/PLM+ will be a web-based system that includes lightweight mobile applications to perform essential functionality for limited disconnected operations to enable near real time logistic management. The sustaining base will maintain GCSS-A system components and data. The capability to coordinate maintenance operations among all echelons of support activities will improve accuracy, timeliness of requisitions, and total asset visibility.

The Army concept is to achieve these results through execution of ERP. ERP is a process change that refines techniques to increase efficiencies and it:

- Takes an enterprise approach to integrate business processes.
- Optimizes enterprise elements like supply, property, finance, and human resource management to work in a solution set.
- Provides consistent information for timely decision making and performance measurement.

TEST AND EVALUATION ACTIVITY



This program is in the pre-Milestone B Blueprinting (engineering) phase. During the Blueprinting Phase, the program office will identify which current systems can be replaced by ERP. The decision to adopt an enterprise resource process requires significant change to Army-wide logistics policy, regulation, doctrine, and tactics, techniques, and procedures. The test community is discussing a test strategy that includes training, cutover activities, and system validation to develop an adequate Test and Evaluation Master Plan (TEMP).

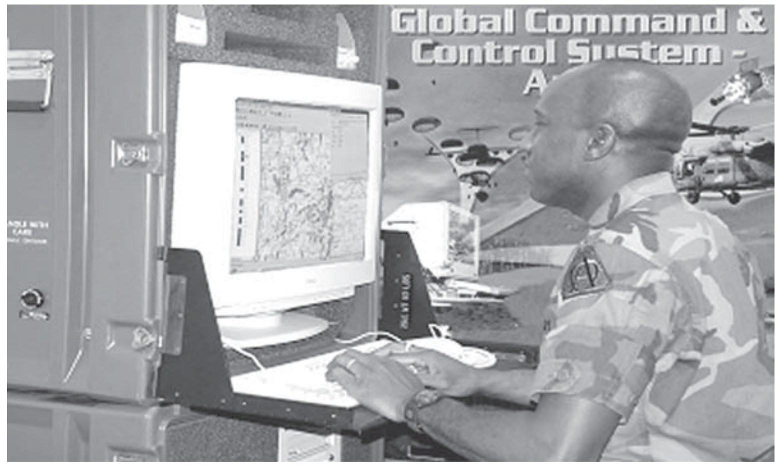
TEST AND EVALUATION ASSESSMENT

GCSS-A will require a robust deployable communications capability to provide reach back to a centralized data repository. GCSS-A (Field/Tactical) must be capable of operating in a web-based environment. Operational test strategies are being developed to ensure that the IOT&E will be adequate to test changes in doctrine and tactics, techniques, and procedures. Early test activity and benchmarking efforts will need to address the issue of communications bandwidth required by active duty and reserve components to successfully implement and use the new GCSS-A system.

The Army plans to submit the GCSS-A TEMP in 2QFY05 for approval.

GCSS-A will be evaluated for the complete ERP solution scope, change in management and training, knowledge transfer strategy, business practices, methodology, and field sustainment. DOT&E has worked closely with the test and evaluation working group since the program's redirection and has played a critical role in defining critical operational issues and criteria's that will be operationally meaningful and measurable for assessing GCSS-A.

Global Command and Control System - Army (GCCS-A)



The GCCS-A is a critical external interface for force readiness and projection.

SUMMARY

- The Global Command and Control System-Army (GCCS-A) is a critical external interface for force readiness and projection in the Global Command and Control System-Joint (GCCS-J 4.0) Operational Test and Evaluation (OT&E).
- During FY04, GCCS-A system testing took place as a component of GCCS-J interoperability testing.
- During the Interoperability test with GCCS-J 4.0(a), Joint Operational Planning and Execution System, both GCCS-J and GCCS-A were unsuccessful.
- GCCS-A 4.0 software is currently undergoing developmental testing at Ft. Hood, Texas.
- Operational testing for GCCS-A 4.0(b) is projected for 2QFY05 and 4QFY05 during follow-on operational testing with GCCS-J.

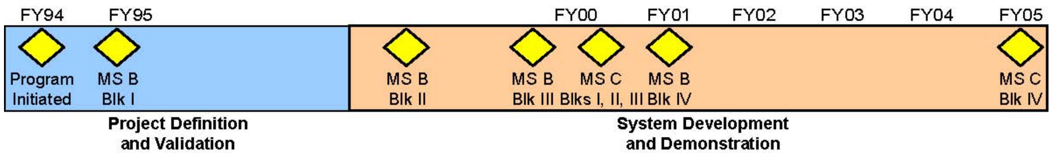
SYSTEM DESCRIPTION AND MISSION

GCCS-A is the Army implementation of the U.S. Global Command and Control System. It provides Army Commanders at all echelons of command with a single, integrated, scalable C4I system that processes, correlates, and displays geographic track information on friendly, hostile, and neutral land, sea, and air forces. It is integrated with available intelligence and environmental information to support command decision-making. GCCS-A is implemented at fixed command centers and as the command and control portion of mobile command centers. GCCS-A fields a baseline system consisting of core functions and a set of mission specific subsystems. Additional subsystems, as well as core upgrades and new functions, will be fielded in future releases. This will allow GCCS-A to evolve as warfighter requirements change, or as new requirements are added.

GCCS-A expands existing C4I baseline capabilities through the evolutionary, incremental implementation of hardware and software releases. Incremental implementation provides commanders with state-of-the-art C4I capabilities that keep pace with evolving operational requirements and technological advances. Central to the success of incremental implementation is adherence to a government standards-based architecture that uses open commercial system hardware, and software that maximize use of non-developmental items. Although incremental implementation is encouraged, GCCS-A must comply with the Defense Information Infrastructure Common Operating Environment to ensure interoperability with Joint and other Army C4I systems.

While GCCS-A brings its own C4I capabilities, a key goal of GCCS-A is to serve as the host for other independently-built applications using the common operating environment. GCCS-A can be used as a building block for C4I systems that range in size from a single server and client workstation, through a large multi-server, multi-client architecture. A wide variety of applications supporting various warfare areas can exist in that architecture. The strength of this approach is the ability to combine disparate warfare areas into a single view of the tactical situation and the ability to share that view with other tactical users both inside and outside of the command.

TEST AND EVALUATION ACTIVITY



- GCCS-A participated as an interfacing system during the GCCS-J 4.0(a) Operational Tests in January 2004 and June 2004.
- GCCS-A developmental testing has been ongoing at the Central Technical Support Facility at Ft. Hood, Texas, since May 2004.

GCCS-J, Version 4.0 (GCCS-J v4.0), is designed to improve data fusion and display, more intuitive graphic interfaces, system automation, security, web enabling, and overall system reliability and maintainability. OT&E evaluated GCCS-J capabilities in operationally realistic environments at Combatant Command headquarters, supporting component headquarters, and other sites worldwide. The test covered the mission areas that are in the requirements identification document. The Requirement Identification Document mission area focused on force planning, deployment, redeployment, employment, and sustainment.

TEST AND EVALUATION ASSESSMENT

During both operational tests with GCCS-J, the GCCS-A server used for interfacing with the Joint Operation Planning and Execution System (JOPES) was not sized properly to process large volumes of traffic. When subjected to the threshold level of stress loading, JOPES transactions severely backlogged the GCCS-A server. System operators had to log off the network, shut the system down, clear the queues, and restart the operations. Any backlog of this nature adversely influences mission accomplishment. The GCCS-J JOPES architecture also experienced performance and synchronization issues, therefore requiring the entire JOPES architecture to be re-evaluated.

GCCS-A plans an update to the Test and Evaluation Master Plan (TEMP) in 2QFY05 to address support testing of GCCS-A Version 4.0. As part of the updated TEMP, GCCS-A must submit a proposed Interoperability Key Performance Parameter for approval.

The Interoperability Key Performance Parameter, and associated Information Exchange Requirements, is required before the Joint Test Interoperability Command can certify GCCS-A as interoperable. The GCCS-A program, the Army Test and Evaluation Command, and Joint Test Interoperability Command are making progress in testing interoperability. Due to redesign of the network and resizing system hardware, operational testing for GCCS-A 4.0 has slipped six months. GCCS-A 4.0(b) will participate in exercises Roving Sands and Red Flag at Fort Bliss, Texas, during 2QFY05. GCCS-A is also scheduled for a Limited User Test in 4QFY05.

Guided Multiple Launch Rocket System (GMLRS)

SUMMARY

- The Army determined that the Dual Purpose Improved Conventional Munition (DPICM) variant of the Guided Multiple Launch Rocket System (GMLRS) rocket was ready for operational testing based on developmental and live fire testing.
- On August 26, 2004, DOT&E approved the Army's initial operational test and evaluation (IOT&E) plan as adequate to assess the effectiveness, suitability, lethality, and survivability of GMLRS DPICM.
- The Army conducted the IOT&E from September to November 2004, in conjunction with the High Mobility Artillery Rocket System (HIMARS) IOT&E.
- The Army currently plans to begin fielding the unitary variant of GMLRS in FY08, but the FY05 Defense Appropriations bill allocated funds to accelerate fielding to forces in high-risk locations by FY06.
- The Army currently intends to buy 140,004 GMLRS rockets. The ratio of DPICM to Unitary rockets is yet to be determined.

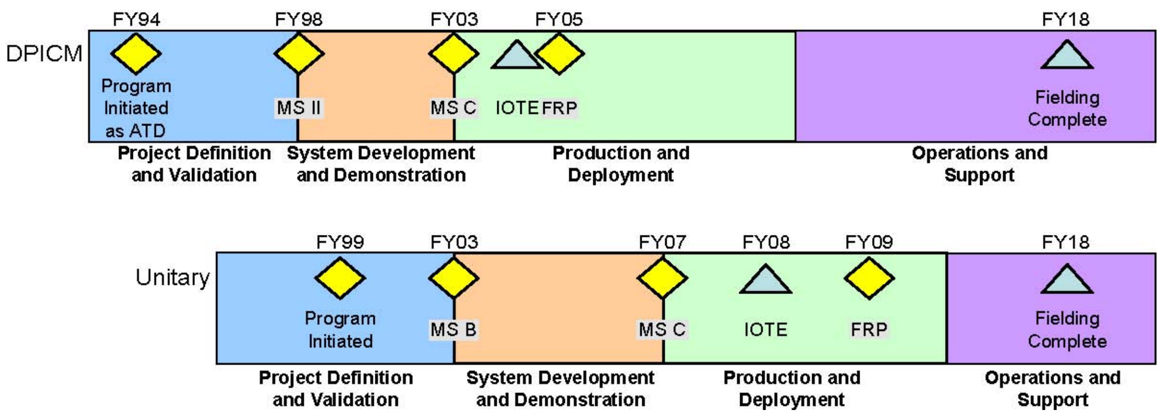
GMLRS consists of two variants of rockets fired from M270A1 MLRS or HIMARS launchers.

SYSTEM DESCRIPTION AND MISSION

GMLRS consists of two variants of rockets fired from M270A1 MLRS or HIMARS launchers. The GMLRS DPICM variant carries 404 submunitions, while the GMLRS unitary rocket will have a single, 200-pound, high explosive warhead. Both variants have enhanced accuracy due to the addition of GPS-enabled guidance and control elements. They have increased range due to a new rocket motor and other extended flight capabilities provided by modified canards.

Maneuver divisions and corps will primarily use GMLRS in a general support role. GMLRS DPICM will attack lightly armored, stationary targets such as personnel, artillery, air defense, and communication sites. GMLRS Unitary will have three fuze settings. It will have a proximity fuze for use against personnel in the open, a delayed fuze for lightly fortified bunkers, and a point detonating fuze for use against single, lightly armored targets. With the planned capabilities of the new rockets, a unit equipped with GMLRS will shoot farther (60 km versus 30 km) and achieve desired effects with fewer rockets due to the improved accuracy. The Army intends the GMLRS DPICM rocket to have fewer dud submunitions than current MLRS rockets. The Army also wants GMLRS Unitary to limit collateral damage.

TEST AND EVALUATION ACTIVITY



The Army completed all production qualification testing of the GMLRS DPICM rocket in accordance with the Test and Evaluation Master Plan (TEMP). DOT&E approved that TEMP in May 2003. The Army fired five GMLRS DPICM rockets in December 2003 and January 2004 as part of a System Integration Test to ensure that the GMLRS rockets were interoperable with the HIMARS system.

In February of 2004, the Army fired six GMLRS DPICM rockets at the Cold Regions Testing Center (CRTC) in Alaska to test performance in extreme cold weather. Due to the extreme conditions, four of the six rockets did not acquire enough satellites to fly GPS-aided. The project office replicated the problem in its hardware-in-the-loop facility at Redstone Arsenal, Alabama, and modified the software for subsequent firings. The Army plans to conduct a CRTC test for GMLRS Unitary in FY07 to confirm this correction.

The Army conducted developmental test/live fire (DT/LF) events in April and May 2004 at White Sands Missile Range, New Mexico. These tests included firing 15 GMLRS DPICM rockets from HIMARS against three threat-representative targets at short-range (18.4 km), mid-range (35 km), and long-range (66.3 km). The Army testers arrayed the targets according to anticipated threat tactics and emplaced passive countermeasures, including sandbags and berms. Two of the three DT/LF events also included GPS jamming.

The Army executed a logistics demonstration in April to test the validity of the system support package and to evaluate the maintenance concept to support GMLRS. Similarly, they performed a maintainability demonstration in May to verify that crews can use hardware and software tools to detect critical failures within the GMLRS rocket.

Contractor testing for the GMLRS Unitary is just beginning. The warhead failed to detonate in the first of three tests. The contractor quickly fixed the fuze design problem, and the remaining two tests were successful. All three rockets met the accuracy requirement. These early tests did not use the final warhead and fuze configuration. Subsequent contractor tests will include the final system design.

TEST AND EVALUATION ASSESSMENT

The Army's developmental testing, including the DT/LF in April and May, indicates that the GMLRS DPICM rocket meets the user's range requirement. Additionally, the DT/LF suggests that the rocket meets the accuracy requirement and that GPS jamming does not adversely affect rocket accuracy. Finally, damage assessment of the surrogate targets indicates that rocket lethality is satisfactory if the target is accurately located. The GMLRS DPICM IOT&E included the firing of 24 GMLRS DPICM rockets at three threat-representative targets. We will use results from developmental testing and the IOT&E to assess range, accuracy, lethality, and overall operational effectiveness of the GMLRS DPICM rocket.

Overall, the GMLRS DPICM production qualification tests have been successful. Based on actual firings of the current rocket configuration, we estimate the rocket reliability to be 0.96, which exceeds the requirement of 0.92. The JROC amended the GMLRS dud rate requirement in November of 2003. The current requirement is to have a submunitions dud rate of less than two percent at ranges between 20 and 60 kilometers and less than four percent at all other ranges. The DT/LF had dud rates of 3.5 percent at 18.4 kilometers, 1.9 percent at 35 kilometers, and 7.9 percent at 66.3 kilometers. The Army believes the high dud rate for the long-range mission was due to a dispensing problem with a single rocket. The IOT&E results will provide another estimate of the dud rate at long ranges, as well as an assessment of the operational impact of the higher dud rate. After reviewing the results of the IOT&E, we will update the reliability rating and the dud estimate to assess the suitability of the DPICM rocket.

The Army is incorporating a self-destruct fuze into the submunitions to meet the dud requirement of less than one percent at all ranges required by DoD policy. The Army is holding flight competitions to select the vendors, but the self-destruct fuze will not be available until after the GMLRS DPICM full-rate production decision in May 2005. The fielding of the self-destruct fuze will require follow-on testing to ensure the fuze has not adversely affected the effectiveness or suitability of the rocket.

High Mobility Artillery Rocket System (HIMARS)

The Army intends HIMARS to provide continuous support to light, airborne, and air assault forces in almost any weather.

SUMMARY

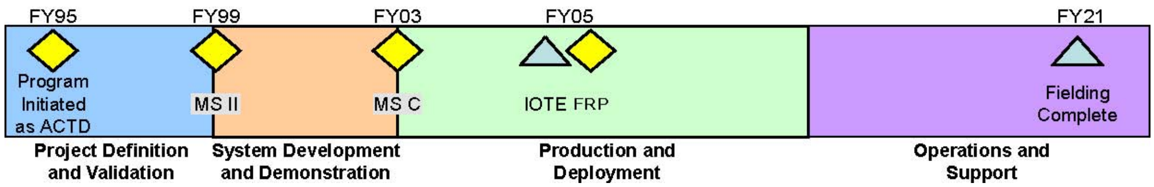
- The Army determined that High Mobility Artillery Rocket System (HIMARS) was ready for operational testing based on its performance in developmental and live fire testing.
- On July 29, 2004, DOT&E approved the Army's initial operational test and evaluation (IOT&E) plan as adequate to assess the effectiveness, suitability, lethality, and survivability of the system.
- The Army conducted the IOT&E from September to November 2004.
- The Army will make the full-rate production decision in May 2005 and plans to equip the first unit with HIMARS in March 2005.
- Pending clarification of its movement toward a modular force structure, the Army intends to buy 888 HIMARS launchers. This total will field 45 battalions.
- The Army deployed three HIMARS Advanced Concept Technology Demonstration (ACTD) launchers to support Joint operations during Operation Iraqi Freedom. They fired 39 Army Tactical Missile System (ATACMS) missiles and maintained a 94 percent operational readiness rate.

SYSTEM DESCRIPTION AND MISSION

HIMARS is an artillery rocket system mounted on a Family of Medium Tactical Vehicles (FMTV) five-ton truck chassis used throughout the Army. It fires the entire family of multiple launch rocket system (MLRS) rockets and missiles up to 300 km. The Army intends HIMARS to provide continuous support to light, airborne, and air assault forces in almost any weather. It can attack enemy artillery, air defense, and other high-value targets that may move quickly. The Army designed HIMARS to be C-130 deployable to support Joint contingency and forced entry forces. The Marine Corps intends to buy 45 launchers and field two HIMARS battalions.

A three-man crew operates the HIMARS launcher. The launcher carries a single pod, consisting of six surface-to-surface rockets or one ATACMS missile. The launcher has its own fire control, position-navigation, and reload systems. It uses software that is 95 percent common with existing M270A1 MLRS launchers. Each HIMARS also has two resupply vehicles (M1084A1 FMTV trucks with onboard materiel handling equipment that carry two rocket/missile pods each) and two resupply trailers (standard M1095 five-ton trailers that carry two rocket/missile pods each).

TEST AND EVALUATION ACTIVITY



The Army flew a combat-loaded HIMARS launcher on a C-130 from Redstone Arsenal, Alabama, to Ft. Sill, Oklahoma, in November 2003. Once the crew off-loaded and derigged the launcher at the assault-landing zone, it moved to a firing point and fired the six practice rockets that it carried during the flight.

During a three-week field exercise at Redstone Arsenal in December 2003, the Army conducted operations at wartime tempos with two HIMARS launchers to validate hardware and software upgrades. The exercise, conducted with Army and Marine Corps crews, included 420 dry-fire missions that simulated firing the entire family of MLRS munitions. The test verified that the new low-cost fire control panel, the weapon interface unit, and the position navigation unit were successfully integrated into the launcher. It also demonstrated that there were no interoperability issues between the launcher, Guided MLRS rockets, and the advanced field artillery data system.

In January 2004, The Army fired 18 reduced-range practice rockets and six Guided MLRS rockets at the Cold Regions Test Center, Alaska. Temperatures ranged from -22 to -24 degrees Fahrenheit. The Army also inserted a new battery and validated that it improved cold start performance identified as a problem during previous cold-weather testing.

The Army conducted a logistics and maintainability demonstration from January through March 2004. Soldiers and Marines demonstrated how operators and maintenance personnel would maintain and support HIMARS, to include the resupply vehicles and trailers. For example, the exercise tested their ability to detect and isolate faults using the HIMARS system software; associated test, maintenance, and diagnostic equipment; and the logistics interactive electronic technical manual. The test identified several shortcomings in the interactive electronic technical manual. The Army has corrected these shortcomings and we will evaluate those corrections during the initial operational testing.

The Army conducted a two-week extended system integration test at White Sands Missile Range, New Mexico, in June 2004. This was the third in a series of three system integration tests for HIMARS. The exercise, again conducted with Army and Marine crews, included one low-rate initial production configured and two production launchers. This exercise allowed the Army to confirm the integration of the HIMARS software and to evaluate the performance of the fully combat-loaded system at realistic operational tempos. The three launchers conducted 336 dry and 42 live fire missions (180 reduced range practice rockets) over a two-day period. Extended System Integration Test III served as a dry run for the IOT&E. Upon the completion of this test, the Army declared HIMARS ready for operational testing.

TEST AND EVAULATION ASSESSMENT

During developmental testing in FY04, the HIMARS program fired: 107 M26 live warhead rockets; 60 M28 extended range live warhead rockets; 29 XM30 Guided MLRS rockets (with GPS technology to enhance accuracy); 200 M28 practice rockets; 396 M28A1 reduced range practice rockets (RRPR); and eight ATACMS missiles. We cannot assess accuracy for the M28 and M28A1 practice rockets because they have no ballistic characteristics. However, preliminary analysis from the other live fire missions indicates that munitions fired from HIMARS are as accurate as when fired from the existing family of MLRS launchers. During the initial operational test, HIMARS fired 18 more M26 rockets, 24 Guided MLRS rockets, and another GPS-aided ATACMS. These firings took place under operational conditions. The GMLRS firings were against targets that represented realistic enemy targets with active and passive countermeasures (berms, sandbags, and GPS jamming). We will use all previous flight data and these additional firings to assess the systems' accuracy and lethality. The IOT&E also included firing an additional 720 M28A1 reduced range practice rockets.

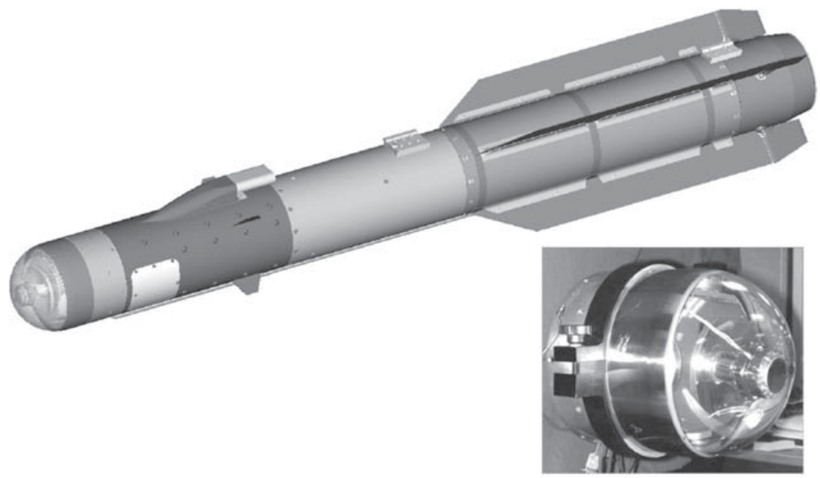
Cumulatively, the mission completion rate (the percentage of missions actually fired on time from the total number of those sent to the launcher) was approximately 92 percent for live fire missions during developmental testing. In developmental tests, HIMARS met the classified requirements for mission cycle and reload times. HIMARS' reliability will be an area that we will examine closely using the IOT&E results. Specifically, we will examine the difference in reliability ratings between live fire missions (actually firing rockets or missiles) and simulated dry fire missions.

The vehicle's cab is designed to protect the crew from the rocket/missile launch and the resulting debris. It does not provide ballistic protection for the crew. To survive enemy threats, HIMARS must rely on concealment between missions and rapid movement after missions. During the IOT&E, we assessed HIMARS' ability to survive by simulating enemy artillery detecting and attacking the HIMARS launch points.

Joint Common Missile (JCM)

SUMMARY

- At Milestone B in April 2004, the Joint Common Missile (JCM) became an Army-led joint program with participation from the Navy and Marine Corps.
- The JCM Test and Evaluation Master Plan (TEMP), approved in April 2004, is adequate to evaluate the development program.

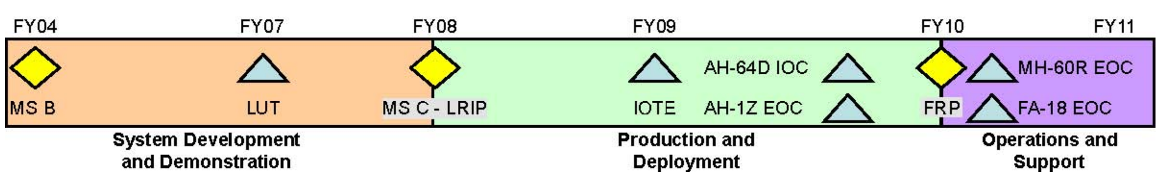


The Services intend the JCM to have precision point targeting, fire-and-forget, and lock-on before/after launch capabilities.

SYSTEM DESCRIPTION AND MISSION

The Services intend the JCM to have precision point targeting, fire-and-forget, and lock-on before/after launch capabilities. The JCM seeker will integrate laser, millimeter wave, and imaging infrared technology. This technology intends to expand targeting options and improve resistance to enemy countermeasures. The JCM warhead design seeks to provide a capability to defeat heavy armor and light vehicles, and to penetrate bunkers and buildings to incapacitate personnel targets. JCM will enable engagements at beyond line-of-sight ranges, thereby increasing launch platform standoff and survivability. The intent is for initial integration to take place on rotary-wing and fixed-wing aircraft. These aircraft include the AH-64D Longbow Apache, the AH-1Z Cobra, the MH-60R Seahawk, and the F/A-18E/F Super Hornet. Integration onto unmanned aerial vehicles and ground platforms may occur in the future. The Army's acquisition objective is 30,978 missiles, while the Navy's acquisition objective is 33,000 missiles.

TEST AND EVALUATION ACTIVITY



Prior to Milestone B, subsystem testing, modeling, simulation, and analysis supported the source selection process.

No significant test and evaluation activity has taken place since the Milestone B contract award to Lockheed Martin. Planned testing for the upcoming year includes component-level testing of the seekers, warhead, and rocket motor. Additionally, wind tunnel testing of the missile shape, blast overpressure testing, jettison flight testing, missile vibration flight testing, and handling qualities flight testing on F/A-18 and AH-64D aircraft will also occur.

TEST AND EVALUATION ASSESSMENT

Based on limited subsystem testing and analysis, there are three areas of concern: platform integration, warhead performance, and the ability to test against naval and urban targets.

- **Platform Integration.** There is risk that, due to the lack of common interfaces and competing priorities, successful integration of the JCM onto all four required aircraft platforms will not occur without impacting the program cost or schedule. Potentially, the JCM may have limited employment modes for one or more aircraft at Milestone C.
- **Warhead Performance.** There is risk that one warhead and fuze may not achieve the required lethal effects against all required target types. The JCM must integrate shape charge and blast fragmentation warhead technology, as well as point detonating and delay fuzes, into a single design. Further complicating warhead performance is the likelihood of extreme attack angles against urban buildings. In the coming year, warhead and fuze testing are planned that may mitigate these concerns.
- **Validity of Simulated Engagements of Naval and Urban Targets.** End-to-end performance against naval and urban targets may be difficult to evaluate. Plans call for computer models supplementing the many engagement scenarios of the JCM. Sufficient focus and funding for these modeling efforts may not be enough to validate the models. Historically, the Army has not significantly modeled ships at sea or buildings in an urban environment. A current modeling effort of ship targets is only focusing on the available range surrogates, not the likely threat targets. Effective comparison of missile flight and warhead testing with these models will strengthen the adequacy of the test and evaluation strategy.

Joint Land Attack Cruise Missile Defense Elevated Netted Sensor (JLENS)

SUMMARY

- The Joint Land Attack Cruise Missile Defense Elevated Netted Sensor (JLENS) will provide the Army an elevated sensor for detecting and tracking air and surface targets.
- JLENS will provide the Army with an elevated fire control radar to enable the Patriot missile to engage low-flying targets at its maximum kinematic range.
- The JLENS program is producing a Test and Evaluation Master Plan to support a July 2005 Milestone B decision for entry into System Design and Development phase.

JLENS supports air-directed surface-to-air-missile and air-directed air-to-air missile engagements through both the engagement on remote and forward pass mechanisms.

SYSTEM DESCRIPTION AND MISSION

JLENS is an airborne radar platform designed to provide surveillance and fire control quality radar data on Land Attack Cruise Missiles and other air breathing targets. The system also acquires and tracks moving surface targets and supports the detection of tactical ballistic missiles.

A JLENS system consists of two aerostats, one containing a surveillance radar and other a Precision Track Illumination Radar. The aerostats are non-developmental 71-meter, unmanned, tethered, non-rigid aerodynamic structures filled with helium and air. Tethered Aerostats attach to a mobile mooring station and a processing station via a fiber optic/power tether. The surveillance radar provides the initial target detection and then cueing to the Precision Track Illumination Radar, which generates a fire control quality track. Link 16 integrates the JLENS system into the Joint Tactical Architecture.

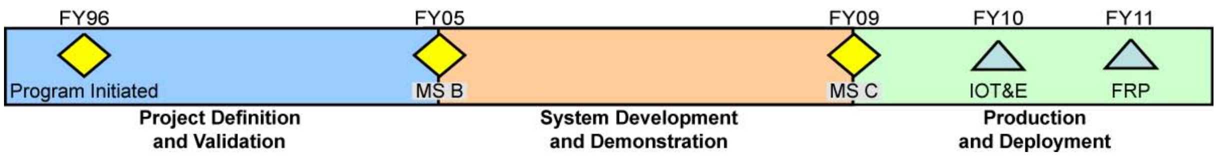
The JLENS system contains a Cooperative Engagement Capability, Single-Channel Ground and Air Radio System, and Enhanced Position Location Reporting System. The system provides key contributions to a generation of a Single Integrated Air Picture through the fusion of high-accuracy, long-range tracking and target classification information with that of other sensors in the Joint Air and Missile Defense architecture. Both radar systems will include Identification Friend or Foe interrogators.

Operators of weapon systems such as Patriot, Navy Standard Missile, the Marine Corps Complementary Low-Altitude Weapons System, and the Army Surface Launched Advanced Medium-Range Air-to-Air Missile can use the JLENS Precision Track Illumination Radar data to engage low-flying terrain masked cruise missiles before their own ground-based sensors can detect them. JLENS supports air-directed surface-to-air missile and air-directed air-to-air missile engagements through both the engagement on remote and forward pass mechanisms.

The JLENS program has two spirals. The first develops one 37-meter aerostat with modified Sentinel radar. The second spiral develops the fielding objective system of two 71-meter aerostats. One carries the Precision Target Illumination Radar while the second aerostat carries the surveillance radar.

The objective of the first spiral is proof-of-concept and development of tactics, techniques, and procedures. Scheduled system developmental testing of Spiral I and Spiral II is in FY05 and FY07, respectively.

TEST AND EVALUATION ACTIVITY



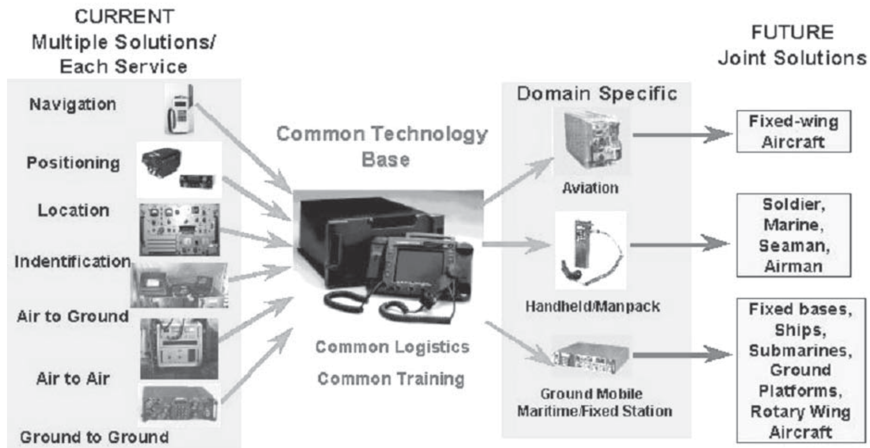
DOT&E developed and provided a Test and Evaluation Concept to the JLENS program manager and operational tester as input into their test planning process. An Integrated Test Team, with DOT&E participation, developed a draft Test and Evaluation Master Plan. Spiral I test planning has begun, and an update is forthcoming. Testing will leverage at least two large force exercises to demonstrate integration and joint interoperability. Spiral testing is good for proof-of-concept and developing tactics, techniques, and procedures. It is also an excellent tool for working with the Surface Launched Advanced Medium Range Air to Air Missile and Patriot missiles. We are expecting many lessons learned for Spiral II. DOT&E has no issues with the test planning.

TEST AND EVALUATION ASSESSMENT

To complete the operational effectiveness and suitability evaluations of the JLENS Spiral II system, live testing of end-to-end aircraft and cruise missile detection-to-engage is needed to determine what the system will deliver and whether there are unresolved issues that impact effectiveness and suitability.

Joint Tactical Radio System (JTRS) Waveforms, Cluster 1 and 5 and Airborne and Maritime/Fixed Stations (AMF)

SUMMARY



The JTRS program will eventually replace various versions of single-channel tactical radios with modular, programmable multi-channel JTRS radios.

- The Joint Tactical Radio System (JTRS) is the Department of Defense family of common software-defined radios which will replace all existing tactical radios.
- JTRS is built around a common, open Software Communications Architecture (SCA), which allows common software waveform applications to be implemented across the family of radios.
- JTRS waveform will define, develop, and evolve the JTRS SCA. There are 32 waveforms identified in the Operational Requirements Document (ORD).
- Milestone B decision review in June 2002 granted approval for JTRS Cluster 1 to proceed into the System Development and Demonstration phase and it established the JTRS waveform program.
- The Milestone B decision review in May 2004 granted approval for JTRS Cluster 5 to proceed into the System Development and Demonstration phase.
- Milestone B for Airborne and Maritime/Fixed Station (AMF) is scheduled for 4QFY05.

SYSTEM DESCRIPTION AND MISSION

JTRS is a family of high-capacity, programmable, multi-band/multi-mode tactical radios designed to provide both line-of-sight and beyond-line-of-sight communication capabilities to the warfighter. The JTRS program will eventually replace various versions of single-channel tactical radios with modular, programmable multi-channel JTRS radios. JTRS uses software-defined radio technology to achieve flexibility, interoperability, and ease of upgrade. The Joint Requirements Oversight Council validated the JTRS ORD Version 3.2 in March 2003. The Army is updating the ORD to a Capabilities Development Document.

The SCA non-proprietary, open-systems architecture is an essential component of the JTRS strategy. This architecture consists of five components:

- SCA Hardware Framework.
- SCA Rule Set.
- JTR Operating Environment.
- Resources and Network.
- Applications Programming Interface (API) Objects.

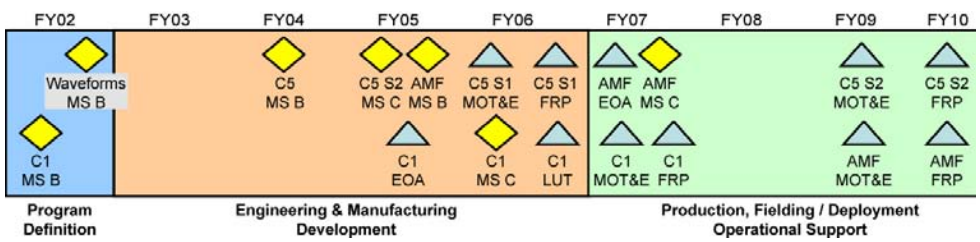
The SCA hardware framework supports hardware-independent platforms by binding software attributes to hardware. The SCA rule provides general guidance to support the open architecture. The operating environment is organized in to three layers; a processor layer, middle layer, and core layer. The resource and API is where the code is applied providing standardized interfaces to allow interoperability.

The JTRS Joint Program Office is the lead for the software communications architecture and software waveforms. The Services will develop the Joint Tactical Radio sets in Service-led joint acquisition programs called clusters.
JTRS Cluster 1, is an Army-led Acquisition Category ID program. Cluster 1 development is the Army and Marine Corps ground vehicular, Air Force Tactical Air Control Party ground vehicular, and Army rotary-wing applications.
JTRS Cluster 5 is an Army-led Acquisition Category IC program. Cluster 5 development is handheld, manpack, and small form-fit sets suitable for embedding in the Army's Future Combat Systems and other platforms requiring a small special purpose radio.

In June 2004, Clusters 3 and 4 merged to form JTRS Airborne, Maritime, and Fixed Station (AMF). JTRS AMF's lead operational test agency is the Commander, Operational Test and Evaluation Force. AMF development will operate with legacy equipment and waveforms currently used by civilian and military airborne, surface, subsurface, and fix-station platforms.

The JTRS Software Communications Architecture originally applied to waveforms operating at frequencies between 2 megahertz to 2 gigahertz. In June 2003, the Assistant Secretary of Defense, Network and Information Integration, expanded the scope of the JTRS SCA to include waveforms operating at frequencies above 2 gigahertz.

TEST AND EVALUATION ACTIVITY



The overall JTRS Cluster 1 schedule was identified as high risk at Milestone B. Current planning for JTRS Cluster 1 requires 186 engineering development Joint Tactical Radio model sets for all test activities, including both contractor and government testing. Contractor developmental testing begins in October 2004 using pre-Engineering Development Model radios.

The Army conducted a JTRS Cluster 5 Milestone B review in May 2004 without an approved TEMP.

TEST AND EVALUATION ASSESSMENT

The Army plans an early operational assessment for JTRS Cluster 1, ground and rotary-wing, in March 2005. Test plan is expected to be submitted to DOT&E in December 2004.

The Cluster 5 contract protest was denied in October 2004. Primary issues with the test strategy include the ability to support the proposed acquisition strategy of a single full-rate decision for multiple products, applicability of existing instrumentation, and the coordination with other programs of record that will integrate the Cluster 5 sets.

Kiowa Warrior (OH-58D)

Kiowa Warrior copes with dust during Operation Iraqi Freedom.

SUMMARY

- The Army completed flight-testing of upgraded Control and Display System (CDS4) software in FY04.
- In response to a request from the Scout/Attack Product Manager to address actual Operation Iraqi Freedom concerns, the Live Fire Test and Evaluation (LFT&E) program added a series of ballistic tests for the tail rotor drive system and the crew seat armor. LFT&E for this helicopter is complete.

SYSTEM DESCRIPTION AND MISSION

The Kiowa Warrior OH-58D is a two-seat, single engine armed reconnaissance helicopter. The Kiowa Warrior features a mast-mounted infrared sensor, television sensor, and laser range-finder/designator. Mounted on both sides of the aircraft are universal weapons pylons. They are capable of accepting combinations of the semi-active laser Hellfire missile, the Air-to-Air Stinger missile, 2.75-inch Folding Fin Aerial Rocket pods, and a .50 caliber machine gun. Recent Kiowa Warrior upgrades include:

- Upgrades to targeting and weapons systems.
- Improvements in air-to-air and air-to-ground communications.
- Improvements in mission planning and management.
- Improvements to available power.
- Improvements to survivability.
- Improvements in night flying.
- Reductions in crew workload due to onboard automation and cockpit integration.

The primary mission of the Kiowa Warrior is armed reconnaissance in air cavalry troops and light attack companies. In addition, the Kiowa Warrior may participate in Joint Air Attack operations, air combat, limited attack operations, or artillery target designation. The prime contractor is Bell Helicopter Textron, Inc.

The Kiowa Warrior is an Acquisition Category III program. The Army's acquisition objective is 411 Kiowa Warrior helicopters. Due to attrition, the current fleet inventory is 359 aircraft.

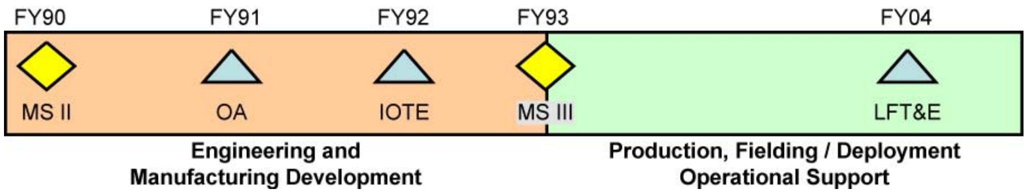
Over time, concerns have surfaced regarding the impact of weight growth on aircraft performance. Our concerns involve the aircraft's power margin, endurance and auto-rotation performance, and the impact of several important Interim Statements of Aircraft Qualification restrictions on the operational utility of the Kiowa Warrior. To address these and other concerns, the Army is executing a Safety Enhancement Program (SEP) for the Kiowa Warrior. The SEP incorporates an improved engine with full-authority digital electronic control, crashworthy crew seats, air bags, improved master controller processor, and a data modem. The intention of the SEP is to improve engine reliability and crew crash protection, reduce pilot workload during emergency maneuvers, and provide additional digitization capabilities. Current funding for the SEP will modify 304 of the required 354 aircraft. Through FY04, 219 aircraft have completed the SEP upgrade process, which should continue through FY09.

DOT&E approved the Kiowa Warrior LFT&E strategy in July 1996. An updated strategy approved in January 1999 identified the resources necessary for an adequate vulnerability assessment program, to include an operating air vehicle.

During Operation Iraqi Freedom, Kiowa Warrior units have maintained high readiness rates in spite of an intense operational tempo and harsh desert conditions. Often employed in route reconnaissance and security missions, the Kiowa Warrior is an effective member of the Joint and combined arms team. In spite of the generally adequate

survivability characteristics of the Kiowa Warrior, ten aircraft were lost in mishaps or were shot down during combat operations over Iraq in FY04.

TEST AND EVALUATION ACTIVITY



The flight-testing of the upgraded CDS4, which is the forth configuration change for the Master Controller Processing Unit and supporting software, took place during FY04. Elements of the assessment include software verification, integration testing of the Improved Data Modem, assessment of the Common Transponder performance, and conduct of a preliminary airworthiness evaluation to address the aircraft's current handling qualities.

The Army completed live fire testing of the ballistic tolerance of the Kiowa Warrior under dynamic conditions this year. Based on the earlier static tests, the Army replaced some tests of the mast-mounted sight with tests of the tail rotor drive system. Additionally, the Scout/Attack Product Manager, based on actions by field commanders in Operation Iraqi Freedom, requested an evaluation of the idea of removing a portion of the crew seat armor as a weight reduction measure. An Army analysis of increased vulnerability due to removing the armor led the product manager to decide to leave the armor in place. The Army subsequently decided to conduct ballistic tests of the main rotor blade.

TEST AND EVALUATION ASSESSMENT

Successful completion of the flight-testing of the CDS software with positive findings resulted in the Army issuing a revised airworthiness release for this new version of CDS software on June 30, 2004. Fielding of CDS4 is in progress and the Army intends to upgrade aircraft simulators to support CDS4 training as soon as possible.

The Army conducted an adequate Live Fire Test program. This program marks the first time that the Army conducted dynamic rotor blade testing as part of LFT&E. The Army intends to release test reports in early FY05. This completes all planned live fire testing on the Kiowa Warrior. A complete evaluation of test results is ongoing.

Land Warrior (LW)

SUMMARY

- Land Warrior (LW) is an integrated system used by the dismounted combat Soldier for tactical operations.
- The Army recently restructured the LW program so that it will produce capabilities in five spirals.
- The Army is currently revising the LW Test and Evaluation Master Plan (TEMP) to accommodate program restructuring.

Land Warrior is an integrated system used by the dismounted combat Soldier for tactical operations.

SYSTEM DESCRIPTION AND MISSION

The LW system includes:

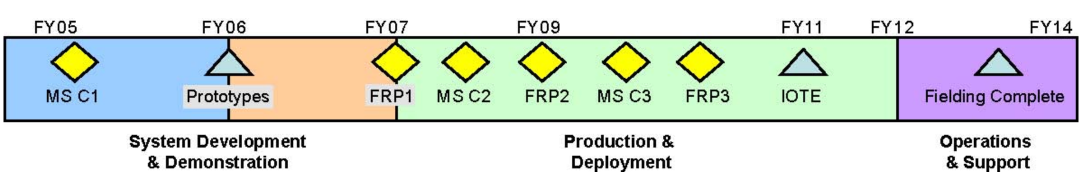
- Weapons
- Laser rangefinder
- Visual displays
- Integrated load carrying equipment with ballistic protection
- Helmet
- Speaker with microphone
- Computer
- Navigation
- Radio

These components are integrated together into a system to support the mission of the dismounted combat Soldier.

The LW integrated Soldier fighting system enhances the lethality, battle-command capability, survivability, mobility, and sustainability of dismounted combat Soldiers, enabling them to engage and defeat enemy targets while minimizing friendly casualties. LW facilitates command, control, and sharing of battlefield information and integrates each Soldier into the digitized battlefield. The system incorporates communications, sensors, and power, improving capabilities without additional weight.

The Army recently restructured the LW program so that it will produce capabilities in five spirals. Spiral 0 focuses on near-term operational needs for the current force and fields the Dismounted Battle Command System (Commander's Digital Assistant and Enhanced Position Location Reporting System). Spiral 1 focuses on providing LW capabilities to the Stryker Brigade Combat Teams. Spirals 2, 3, and 4 focus on achieving LW integration within the Future Comabat System (FCS) force structure.

TEST AND EVALUATION ACTIVITY



The TEMP was approved in December 2003. The TEMP will need updating to reflect the revised LW acquisition approach.

There have been no operational tests to date. Operational testing will begin with a series of developmental/operational test events starting in FY05. Present plans call for the Initial Operational Test and Evaluation (IOT&E) in FY11. LW participated in a Joint Contingency Force Advance Warfighting Experiment (JCF AWE) at the Joint Readiness Training Center, Fort Polk, Louisiana, in September 2000. During the JCF AWE, a platoon from the 82nd Airborne Division, equipped with prototype LW systems, demonstrated that LW had the potential to enhance tactical movement, increase survivability, and provide situational awareness.

TEST AND EVALUATION ASSESSMENT

Current National Information Security policy prohibits uncleared LW soldiers from accessing the Tactical Internet, which is classified SECRET. Since the LW system services a large body of uncleared users, this multi-level security issue will need resolution before the IOT&E.

In addition, LW battery life and power consumption are both critical to mission success. Both of these issues will need to be resolved prior to the IOT&E. Two Limited User Tests will be conducted prior to the IOT&E in order to reduce the risk of previous reliability and power problems associated with the program. Finally, LW and FCS integration will likely be a challenge in any future operational test events.

Line-of-Sight Anti-Tank Missile (LOSAT)

SUMMARY

- The Army realigned the Line-of-Sight Antitank System (LOSAT) program in early FY04, fielding only one of the five originally-planned battalions.
- The strategy fields the one battalion via a series of low-rate initial production (LRIP) decisions.
- The revised strategy still maintains that the Army has a requirement for five battalions, pending the availability of additional funding.
- The Army determined that LOSAT was ready for the Milestone C LRIP decision based on developmental testing and a Limited User Test (LUT) in 3QFY04.
- The Army conducted the Milestone C review in July 2004, but the FY05 Defense Appropriations Act eliminated funding for the program.

LOSAT is an antitank weapon system that fires a 177-pound penetrator rod munition.

SYSTEM DESCRIPTION AND MISSION

LOSAT is an antitank weapon system that fires a 177-pound penetrator rod munition. It is the first of the Army's Kinetic Energy Missile programs. The Army intends LOSAT to provide anti-armor capability for light, airborne, and air assault forces. The Army requires LOSAT to defeat any known or projected armor system at ranges out to approximately 5000 meters. A five-man squad operates the LOSAT system. The Fire Unit, mounted on a High Mobility Multi-Purpose Wheeled Vehicle (HMMWV) chassis, carries four missiles. The fire control system is similar to the Improved Bradley Acquisition System and features a second-generation Forward-Looking Infrared sensor. A second HMMWV tows a resupply trailer that carries eight additional missiles. The system is deployable by strategic and tactical airlift (e.g., C-5, C-17, and C-130).

TEST AND EVALUATION ACTIVITY

During 2004, the Army completed production qualification testing of the missile, Fire Unit, and Resupply Trailer. The Army also conducted a LUT at Fort Bliss, Texas, in April through May 2004. The LUT was adequate to examine selected aspects of the LOSAT operational effectiveness, operational suitability, and survivability. The LUT provided sufficient information to support the Army's Milestone C LRIP decision in July 2004.

The program completed a 23-missile flight developmental test program in 2004. This program supported lethality Live Fire Test and Evaluation (LFT&E), including assessing the probability of hitting the target. Vulnerability LFT&E began

in late FY03. If the Army were to revive the program for FY05, testing should be complete by early FY06 to support an independent assessment of LOSAT lethality and vulnerability.

The Army conducted a Dismounted Battlespace Battle Lab Deployability Demonstration at Fort Bragg, examining tactical deployability. Specifically, the demonstration examined whether helicopters could lift and transport the system. Prior to program termination, the Army planned to conduct an initial operational test and evaluation in 4QFY06.

TEST AND EVAULATION ASSESSMENT

Developmental testing and the LUT demonstrated that LOSAT has devastating effects against bunkers, reinforced urban structures, and armored vehicles at short and medium ranges. However, LOSAT has not yet met probability of kill rates required by the Operational Requirements Document against threat-representative targets at ranges beyond the capability of anti-armor missiles in the current inventory. Additional testing is also required to demonstrate that LOSAT can hit moving targets that employ evasive maneuvers and countermeasures. The Army has demonstrated LOSAT's helicopter transportability, but major system reconfiguration is currently required to sling-load the system. Further testing in realistic conditions is required to prove interoperability, effectiveness in extreme environments and complex battlefield conditions, and military utility as part of a combined arms team.

In testing to date, the reliability of the missile and the Resupply Vehicle appear to be satisfactory. The reliability of the LOSAT Fire Unit and the Field Tactical Trainer is a concern, particularly in extremely hot weather. The performance of the Field Tactical Trainer is critical since crews will not have the opportunity to fire live missiles during proficiency training. The Army has not formalized or tested LOSAT system logistics and maintenance concepts.

The Army has tested some elements of system survivability, to include the capability of the crew to operate in chemical protective clothing. Additionally, LOSAT's firing signature is comparable to the signature of the current TOW missile. However, the optics are susceptible to small arms fire and fragments from indirect fire. The Army suspended system-level testing of survivability pending future funding.

The Army has not updated the Test and Evaluation Master Plan since June 2003.

Non-Line-of-Sight Cannon (NLOS-C)

SUMMARY

- The Non-Line-of-Sight Cannon (NLOS-C) is part of the Future Combat System (FCS) program.
- The Army recently restructured the FCS program so that it will produce capabilities in four "spirals."
- The Army intends to develop an NLOS-C prototype for testing in the first FCS spiral by FY08. It intends to begin fielding NLOS-C in the second FCS spiral by FY10.
- The Army is currently revising the FCS Milestone B Test and Evaluation Master Plan (TEMP) to accommodate program restructuring.

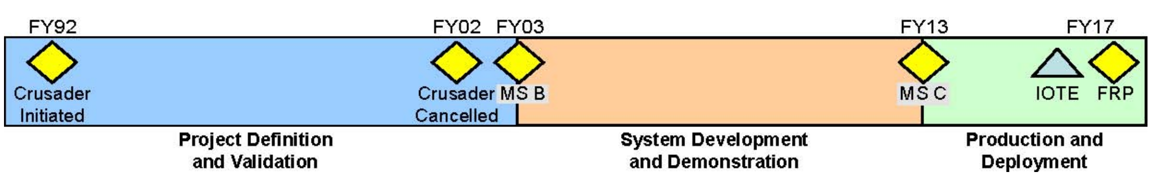
Between September 2003 and January 2004, the Army conducted live fire tests of the NLOS-C demonstrator at Yuma Proving Grounds, Arizona, to examine whether a lightweight chassis is stable enough to support a 155mm cannon during firing.

SYSTEM DESCRIPTION AND MISSION

NLOS-C will be a manned FCS platform that provides networked, extended-range fire support for combined arms units. NLOS-C will likely mount a 155mm cannon on an FCS common chassis. The Army intends for NLOS-C to weigh less than 20 tons and be transportable by C-130 aircraft.

A two-man crew will operate NLOS-C and process fire missions from all fielded and developmental target acquisition and command and control systems. NLOS-C will compute its own firing data and shoot 30 plus kilometers with a circular error probability (CEP) of no greater than 0.55 percent of the range. The Army intends to incorporate an automated ammunition handling system to maintain a 6 to 10 round-per-minute rate of fire with the entire suite of 155mm ammunition. NLOS-C will carry at least 24 rounds. It will respond to fire missions with the first round within 20 seconds when emplaced and 30 seconds when moving. The Army is requiring a reliability rating of 741 hours mean time between system aborts.

TEST AND EVALUATION ACTIVITY



Following the cancellation of the Crusader program in 2002, the Army awarded a contract to United Defense Limited Partnership to build a concept technology demonstrator for the NLOS-C. Building on its Crusader experience, the contractor mounted a 155mm cannon and armament from the Lightweight 155mm Howitzer program on an aluminum hull with 18-inch band tracks. The demonstrator uses hybrid electric drive, a 400 horsepower diesel engine, and the automated ammunition handling system from the Crusader program. United Defense Limited Partnership delivered the demonstrator to the Army in the summer of 2003.

Between September 2003 and January 2004, the Army conducted live fire tests of the NLOS-C demonstrator at Yuma Proving Grounds, Arizona, to examine whether a lightweight chassis is stable enough to support a 155mm cannon during firing.

Between January and February 2004, the Army conducted mobility assessments with the NLOS-C demonstrator at the contractor's test track in Santa Clara, California. This event assessed fuel economy, the ability to climb various grades, noise levels, steering, turning radius, pivot steering, acceleration, maximum speed, and braking.

In June, July, and August of 2004, the Army conducted testing with an M109A5 howitzer fitted with the NLOS-C breech and laser ignition system to examine why laser flash lamps failed when firing at high zones (charges).

TEST AND EVALUATION ASSESSMENT

During the September 2003 to January 2004 tests, the NLOS-C Demonstrator verified that the platform was sufficiently stable to fire a 155mm cannon with external stabilizers that the Army hopes to eliminate from the final design. The demonstrator fired 240 rounds during these tests, including an eight round mission at a six round-per-minute rate of fire. The 20-ton weight limit and C-130 deployability will be difficult to achieve without sacrificing effectiveness, survivability, or sustainability.

The reliability requirement for 741 hours mean time between system aborts is more than a ten-fold increase over the Crusader requirement. It will be a challenge to meet this requirement, as NLOS-C will be equipped with an automated ammunition handling system.

The Army is revising the FCS Milestone B TEMP to accommodate recent acquisition strategy changes and provide additional definition to the test strategy. The latest draft does not provide enough detail to assess test program adequacy. DOT&E will work with the Army to develop an adequate test strategy.

Objective Individual Combat Weapon (OICW) (XM29) Increment I

SUMMARY

- The Objective Individual Combat Weapon (OICW) Increment I family of rifles may replace the M16/M4 family of weapons throughout the Army, as well as other selected systems such as the M9 pistol, M203 grenade launcher, M500 shotgun, and M249 squad automatic weapon.
- The XM8 family of rifles is a candidate system to fufill the OICW Increment I requirement.
- The Army is scheduled to conduct an OICW Milestone C/low-rate initial production (LRIP) review in June 2005.
- Since the XM8 carbine and special compact variants have shorter barrels than the M16/M4 family of rifles, there is the potential for decreased lethality with the XM8 when firing the standard M855 5.56mm cartridge.

The XM8 Carbine is a candidate weapon to replace the M16/M4 family of weapons throughout the U.S. Army.

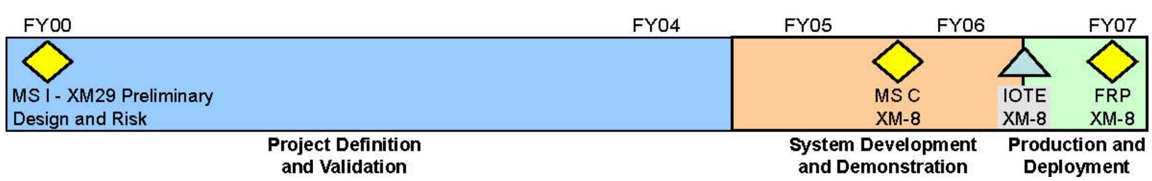
SYSTEM DESCRIPTION AND MISSION

The XM8 is a candidate system for Increment I of the OICW. The XM8 is a conventional, direct fire, kinetic energy family of weapons that has three variants:

- Special Compact: 9-inch barrel; intended for combat in close quarters; replaces the M9 pistol.
- Carbine: 12.5-inch barrel; replaces the M16/M4 family of rifles.
- Designated Marksman: 20-inch barrel; intended for long-range precision engagements.

The XM8 initial baseline capabilities include a sighting system that facilitates both rapid-close and precision long-range engagements, and a pointer/illuminator system that facilitates night engagements in combination with the soldier's image intensification night vision devices. The XM8 includes an area suppression lethality module, which replaces the M203 grenade launcher and includes the shotgun lethality module that replaces the M500 shotgun.

TEST AND EVALUATION ACTIVITY



The Army has not updated the OICW Test and Evaluation Master Plan (TEMP) since the June 2000 Milestone I decision. The program manager is currently revising the OICW TEMP to address the incremental approach development, which includes the Increment I family of weapons. The U.S. Army Infantry Center approved a capabilities development document in July 2004 that identifies the OICW Increment I as a family of kinetic energy rifles.

The Army approved the Capability Development Document (CDD) in October 2004. The Army's Training and Doctrine Command has yet to approve the critical operational issues and criteria.

The first generation of XM8 rifles completed developmental testing and completed a Proponent Assessment conducted by the U.S. Army Infantry Center at Fort Benning, Georgia, in early FY04. Several changes were made to the rifle because of reliability and soldier-weapon interface issues:

- Hand guard redesign
- Bolt housing group redesign
- Additional iron back-up sight

The second generation of XM8 weapons is currently undergoing developmental testing.

TEST AND EVALUATION ASSESSMENT

The Army has not conducted XM8 operational testing to date, and developmental testing is ongoing, but has not yet produced sufficient data to assess XM8 effectiveness or suitability. Preliminary lethality data from the Army's Armament Research and Development Center indicate that the wound potential of the M855 cartridge, when fired from the XM8 special compact and carbine variants, may be less than that of the M855 cartridge when fired from the fielded M16 rifle with a 20-inch barrel. Quantitative testing by the Army, however, has not yet been conducted. The XM8 family has the capability to switch to different barrels at unit-level and longer barrels will be pursued by the program if lethality requirements are not met. DOT&E will continue to monitor these preliminary results as data becomes available.

Phased Array Tracking Radar Interception on Target (PATRIOT)/Medium Extended Air Defense System (MEADS) Combined Aggregate Program (CAP)

MEADS will be a highly mobile air and missile defense system for the protection of maneuver forces and fixed assets.

SUMMARY

- PAC-3 demonstrated effectiveness, suitability, survivability, and lethality against a limited set of threats during Initial Operational Test and Evaluation (IOT&E). However, both IOT&E and Operation Iraqi Freedom (OIF) revealed problems with the Phased Array Tracking Radar Interception on Target (PATRIOT) system.
- The Army is addressing these problems through the PAC-3 evolutionary development program.
- The Army conducted two highly successful PAC-3 flight tests during 2004, the second of which involved multiple targets and PAC-3 interceptors in flight simultaneously. These tests completed objectives still outstanding from the IOT&E.
- With OSD approval of Milestone B, the Army successfully merged the PAC-3 program and the Medium Extended Air Defense System (MEADS) program into the PATRIOT/MEADS Combined Aggregate Program (CAP).

SYSTEM DESCRIPTION AND MISSION

The PAC-3 air and missile defense system detects, tracks, engages, and destroys short-range ballistic missiles, cruise missiles, fixed-wing aircraft, and other air-breathing threats. A PAC-3 battery includes an Engagement Control Station for battle management, a C-band radar, and up to eight launchers. PAC-3 batteries have a mix of new hit-to-kill PAC-3 missiles and older blast-fragmentation PAC-2 missiles, and PAC-2 Guidance Enhanced Missiles.

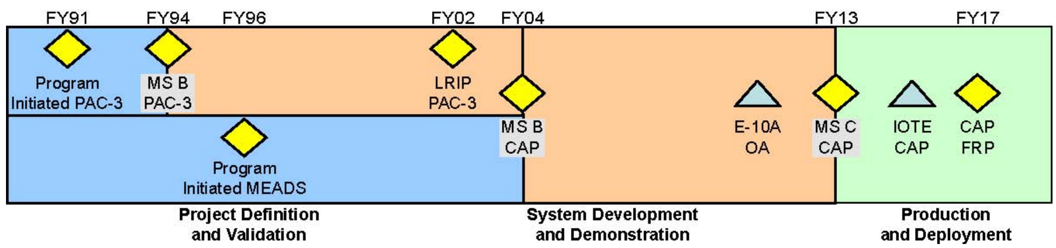
MEADS will be a highly mobile air and missile defense system for the protection of maneuver forces and fixed assets. The system should provide area and point defense capabilities against multiple, simultaneous, 360-degree attacks by ballistic missiles, large caliber rockets, fixed-wing and rotary-wing aircraft, unmanned aerial vehicles, cruise missiles, tactical air-to-surface missiles, and anti-radiation missiles. It should be strategically deployable by C-130 roll-on/roll-off, and tactically mobile to keep up with maneuver forces. MEADS is an international co-development program with Germany and Italy.

The Army merged the PAC-3 program and the MEADS program into the PATRIOT/MEADS CAP. The CAP includes improvements to the current PATRIOT air and missile defense system and the development of MEADS through three acquisition increments (AIs):

- AI-1 will produce an initial Battle Management, Command, Control, Communications, Computers, and Intelligence (BMC4I) element to replace current PATRIOT BMC4I elements. AI-1 IOT&E is in FY09.
- AI-2 will produce a new lightweight launcher and an improved Missile Segment Enhancement PAC-3 missile. AI-2 IOT&E is in FY11.

- AI-3 will produce the objective MEADS system, which will include the objective BMC4I element, a new UHF-band surveillance radar, and a new X-band multifunction fire control radar. The system will use both PAC-3 and Missile Segment Enhancement missiles. AI-3 IOT&E is in FY16.

TEST AND EVALUATION ACTIVITY



The Army conducted PAC-3 flight test ATM 2-1 at White Sands Missile Range, New Mexico, on March 4, 2004. The PAC-3 system fired two PAC-3 missiles at a PATRIOT as a Target (PAAT) missile, emulating a short-range ballistic missile. The first PAC-3 killed the target, satisfying a flight test objective from the IOT&E (Flight Test OT/DT-4b). The second PAC-3 self-destructed as designed.

The Army conducted PAC-3 flight test DT/OT-11 at White Sands Missile Range on September 2, 2004. DT/OT-11 was the first flight test to use PAC-3 missiles that incorporate cost reduction initiative changes to reduce missile cost while maintaining performance. Using a shoot-shoot tactical firing doctrine, the Army fired two PAC-3 missiles at a Modified PAAT (MPAAT) target missile. The first PAC-3 missile successfully killed the modified MPAAT. The second PAC-3 self-destructed as designed. Near simultaneously, using shoot-look-shoot tactical firing doctrine, the Army fired one PAC-3 missile at a cruise missile flying the same trajectory as the target in the failed OT-3b flight test during IOT&E. The PAC-3 successfully killed the cruise missile.

There are currently 28 flight tests scheduled for FY05-10 to verify upgrades to the PATRIOT system. There are also three flight tests scheduled for FY07-09 to test CAP AI-1, 7 flight tests scheduled for FY08-FY11 to test CAP AI-2, and 13 flight tests scheduled for FY11-17 to test CAP AI-3.

The Program Office conducted the MEADS Risk Reduction Effort exit demonstration near Rome, Italy, on May 6, 2004. DOT&E approved the PATRIOT/MEADS TEMP in August 2004. This fully-funded TEMP is adequate to evaluate the PAC-3 evolutionary development program and is adequate to evaluate the PATRIOT/MEADS CAP.

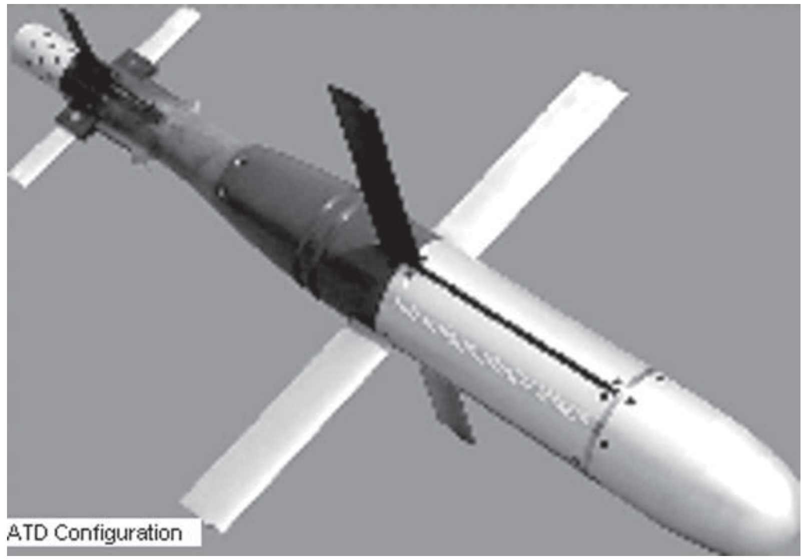
TEST AND EVALUATION ASSESSMENT

PAC-3 demonstrated effectiveness, suitability, survivability, and lethality against a limited set of threats during IOT&E. However, IOT&E and OIF revealed significant problems with the PATRIOT system. The Program Office is addressing these problems through the PATRIOT evolutionary development program.

DOT&E has not yet received sufficient data on PATRIOT operations during OIF to perform a comprehensive evaluation of PATRIOT combat performance. However, the data we have received suggest a need for one or two additional flight mission simulator hardware-in-the-loop systems to conduct battalion level testing. Only one flight mission simulator was available during IOT&E, which limited testing to only one PATRIOT battery at a time. Data also suggests that air and missile defense testing should occur during Joint and coalition exercises that include large numbers of different aircraft types, sensors, BMC4I, and weapon systems.

The current MEADS test plan contains no U.S.-only operational testing prior to the battalion-level IOT&E in FY16. However, the International MEADS Evaluation Board plans to conduct a Fire Unit-level international operational test that includes two DT/OT flight tests and a multiple phase ground test program using production-representative equipment prior to the first unit equipped in FY15. Such a test would verify operational system performance prior to initial deployment. It would also provide an opportunity to discover and fix system problems prior to U.S. IOT&E.

Precision Guided Mortar Munition (PGMM)



The Army will use PGMM to incapacitate personnel in standard brick over block masonry structures, collapse earth and timber bunkers, and defeat stationary lightly armored vehicles or incapacitate personnel inside.

SUMMARY

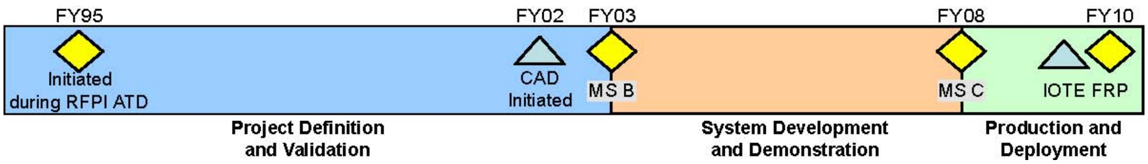
- By 2001, the Rapid Force Projection Initiative Advanced Technology Demonstration (RFPI ATD) produced a prototype 120mm mortar round that could achieve controlled-glide flight. This round incorporated gyroscopic guidance with a laser seeker on a maneuverable airframe.
- Following the ATD, a Component Advanced Development (CAD) effort focused on identifying the most effective warhead and fuze technologies. Lockheed Martin completed this effort in September 2003.
- The Army approved Precision Guided Mortar Munition's (PGMM) entry into its System Development and Demonstration (SDD) Phase with a conditional Milestone B decision in September 2003. Final Milestone B approval occurred in May 2004, following approval of the PGMM operational requirements document by the Joint Requirements Oversight Council.
- The Army announced in December 2003 that Alliant Techsystems (ATK) would be the SDD contractor. Before the Army actually awarded the contract, however, Lockheed Martin, the ATD and CAD contractor, protested ATK's selection.
- In May 2004, the GAO instructed the Army to reopen discussions with the two contractors and to reevaluate the final proposal revisions.
- The Army plans to complete the reevaluation process, select an SDD contractor, and award the contract by the end of calendar year 2004.

SYSTEM DESCRIPTION AND MISSION

The PGMM is a 120mm mortar munition. The Army intends that PGMM will provide the maneuver commander with an organic capability to attack critical point targets with low collateral damage. The Army will use PGMM to incapacitate personnel in standard brick over block masonry structures, collapse earth and timber bunkers, and defeat stationary lightly armored vehicles or incapacitate personnel inside. PGMM will be compatible with all current and future mortar and mortar fire control systems. PGMM's terminal guidance will employ a man-in-the-loop laser designator to ensure precision engagement and minimize collateral damage. The Army intends PGMM to be compatible with all DoD laser designation devices.

PGMM is an Acquisition Category II development program that will produce three evolutionary increments. The Army plans for Increment I to provide the ability to engage point targets at ranges comparable to current 120mm mortar munitions. The intent for Increment II is to increase the engagement range to 10 km with 12 km as an objective. Finally, the Army intends for Increment III to increase the engagement range to 12 km with 15 km as an objective. The Army also wants Increment III to defeat moving, lightly-armored vehicles; to destroy additional masonry targets; and to achieve enhanced maneuverability during its flight to the target. The Army plans to conduct the Milestone B decision reviews for Increments II and III in FY08 and FY10, respectively.

TEST AND EVALUATION ACTIVITY



In ATD and CAD testing prior to the Milestone B decision, guidance, airframe, control actuation, sensor (laser detector), and warhead/fuze subsystems demonstrated appropriate technology readiness levels for entry into the SDD phase of the acquisition cycle. No test activity has occurred since Lockheed Martin completed the CAD effort in September 2003.

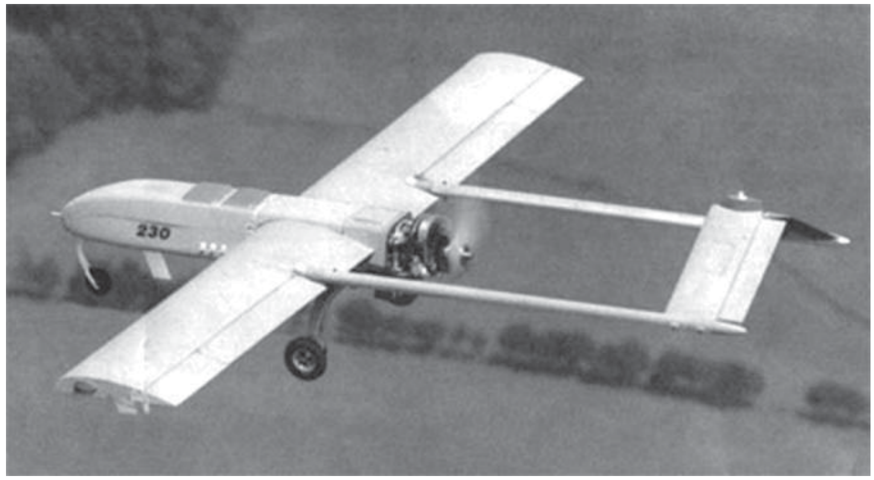
TEST AND EVALUATION ASSESSMENT

Once the Army awards the SDD contract, the PGMM Integrated Product Team will reconvene and update the Milestone B Test and Evaluation Master Plan (TEMP). The Milestone B TEMP will provide details of SDD contractor and government developmental test plans. It will also describe sufficient operational and live fire testing to support major program decisions such as the Milestone C low-rate initial production (LRIP) and the full-rate production decisions. We anticipate that the Army will submit this TEMP for our review by the summer of 2005.

Because Soldiers have not previously used laser designators for terminal guidance of mortar munitions, the system evaluation will include a limited user test (LUT). The LUT will assess the effectiveness of the tactics, techniques, and procedures for the employment of PGMM, to include limitations on laser designator employment.

The January 2003 PGMM Acquisition Strategy and Acquisition Plan states that the Army plans to award a full-rate production contract through full and open competition. Should a supplier other than the SDD/LRIP contractor win this contract, the Army will need to conduct additional operational test and evaluation events to ensure the operational effectiveness and suitability of production rounds.

Shadow 200 Tactical Unmanned Aerial Vehicle (TUAV)



TUAV system is the ground maneuver commander's primary day/night reconnaissance, surveillance, and target acquisition system.

SUMMARY

- Shadow 200 entered full-rate production in December 2002.
- Follow-on testing continued in FY04 with Shadow performing an interoperability certification test in November 2003. The purpose of this event was to demonstrate connectivity with fielded versions of Army Battle Command System software. The system received only a specified interface certification.
- Shadow is executing a product improvement effort; know as Block 1B, to improve performance. Improvements have reduced target location error from the 200 meters during Initial Operational Test and Evaluation (IOT&E) to 78 meters in a developmental test event.

SYSTEM DESCRIPTION AND MISSION

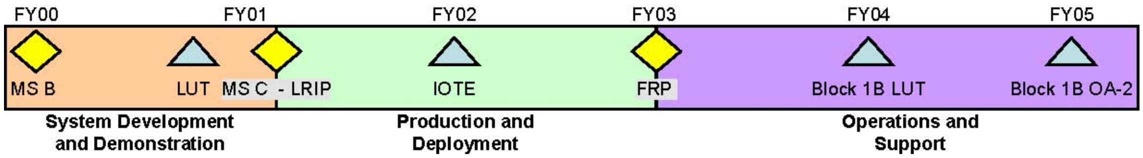
The Tactical Unmanned Aerial Vehicle (TUAV) system is the ground maneuver commander's primary day/night reconnaissance, surveillance, and target acquisition system. The system is composed of four air vehicles, modular mission payloads, ground control stations, launch and recovery equipment, and communications equipment.

Shadow 200 entered into IOT&E prematurely in April 2001. The Army downgraded the IOT&E to a Limited User Test after two air vehicle incidents. DOT&E approved the revised test strategy in March 2002. The Army conducted a second IOT&E in April and May of 2002. We found the system to be operationally effective under fair weather conditions for cued reconnaissance and surveillance missions, and not operationally effective for target acquisition missions.

Although Shadow 200 met its requirement for operational availability, we found it to be not suitable due to the frequency of occurrence of crashes, hard landings, and engine replacements. DOT&E raised concern in the beyond low-rate initial production report that these deficiencies would be cost prohibitive for sustained operations. Shadow 200 continues to experience attrition at unsupportable rates.

Shadow 200 entered full-rate production in December of 2002. A Test and Evaluation Master Plan update is in the coordination process with approval anticipated in early FY05. There are two versions of the Shadow System. Block 1A is currently in the field. Block 1B is in development.

TEST AND EVALUATION ACTIVITY



Shadow 200 performed an interoperability certification test in November 2003 on the Block 1A system. The Army conducted this event in conjunction with the 2nd Infantry Division Capstone Warpath II exercise. The purpose of this event was to demonstrate connectivity with fielded versions of Army Battle Command System.

Shadow 200 is in the process of a product improvement effort. Because of the accelerated fielding schedule, the program office has already awarded the contract for the improved system, known as Block 1B. The Army intends Block 1B improvements to replace the avionics suite with a Global Position System (GPS)-coupled inertial navigation system, which improves target location error. Besides the change in the avionics suite, Block 1B also includes an increase in the size of the airframe. This larger airframe is necessary to make room for the Tactical Control Data link. The new airframe should also increase the range capability of the system.

The Army plans to conduct testing of the Block 1B upgrades in three phases: during developmental testing, during a customer test to verify improvements to target location error, and during an operational assessment of the first unit equipped. Developmental testing consists of a logistics demonstration, qualification flight-testing, and Electromagnetic Environmental Effects testing. The customer test for target location error followed the developmental testing. During the customer test, trained Shadow 200 payload operators reported on a variety of static targets with known geo-location. The contractor performed all other Shadow support functions including maintenance, flight operations, and air vehicle operation. The Army intends to conduct the final phase of testing during the capstone training exercise of the first unit equipped with the Block 1B system in early FY05. This event will include artillery fire adjustment for second round fire-for-effect missions.

TEST AND EVALUATION ASSESSMENT

The goal of the interoperability test was to obtain a system certification from the Joint Staff Command, Control, Communications, and Computers Systems Directorate (J6) on the fielded system – Block 1A. The Shadow 200 was able to demonstrate all of the required interfaces. However, the Shadow 200 did not receive a system certification. Just prior to the start of the test, the Army updated the requirements document to include many new required interfaces, which were still in development. The J6 granted a specified interface certification for the system present during test. This specified interface certification is sufficient for addressing interoperability requirements for employment for the next year until follow-on testing for the new requirements is complete.

The program office has not completed developmental testing of the Block 1B upgrade. A Block 1B air vehicle sustained significant damage during landing in flight-testing this summer. Due to the incident, the Army ceased all testing for a period of two weeks while the accident investigation occurred.

This incident also postponed the start of the target location error customer test for one week. The customer test also encountered difficulty. The Army shortened the 2-day pilot test to one day because of an unrelated crash of a Block 1A air vehicle. Difficulties continued as high winds prevented the resumption of testing even after the Army granted clearance for test flights to resume. The first day of the three-day customer went well. Data collection was limited on the second day because of rain. On the third day, the Block 1B air vehicle lost the command and control link with the ground station and crashed, indefinitely postponing the test. The cause was later determined to be a manufacturing problem with the flight processor board. The Army was able to collect sufficient data during the abbreviated event to continue testing. The target location error has improved from greater than 200 meters during IOT&E to 78 meters during a developmental test event. The Shadow 200 now meets the requirement for target location error.

The operational assessment with the first unit equipped has yet to be scheduled. The Army has postponed fielding for the near future. Fielding cannot occur until developmental testing is complete and the subsequent safety release obtained. We anticipate testing and fielding to take place early in FY05.

Stryker Armored Vehicle

SUMMARY

Stryker is a family of medium armored vehicles for the Army's Stryker Brigade Combat Team.

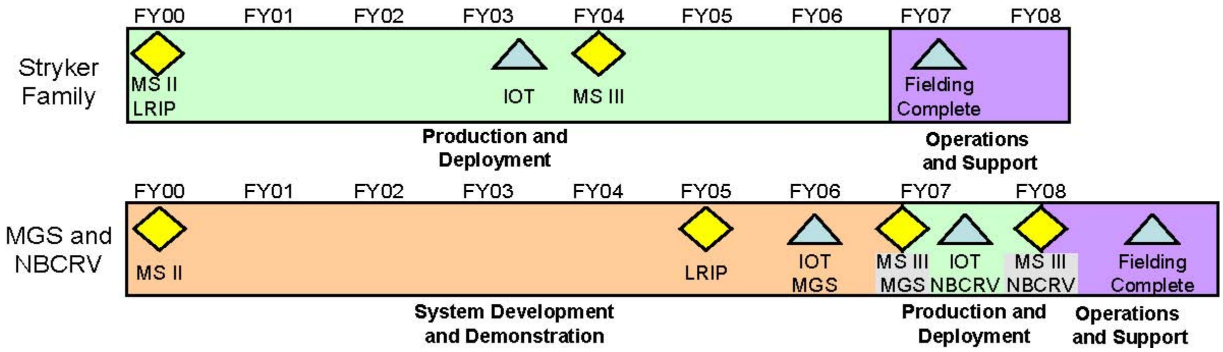
- By 2QFY04, the Army completed Initial Operational Test and Evaluation (IOT&E), developmental testing, the operational evaluation, and Live Fire Test & Evaluation (LFT&E) for the eight of the Stryker Family of Vehicles.
- DOT&E assessed the Anti-Tank Guided Missile Vehicle (ATGMV), Commander's Vehicle (CV), Fire Support Vehicle (FSV), Infantry Carrier Vehicle (ICV), Medical Evacuation Vehicle (MEV), and Reconnaissance Vehicle (RV) as operationally effective, suitable, and survivable with limitations for use in small scale contingencies.
- DOT&E assessed the Engineer Squad Vehicle (ESV) as survivable with limitations for use in small-scale contingencies, but not operationally effective and not operationally suitable.
- DOT&E assessed Mortar Carrier B (MC-B) as operationally effective and survivable with limitations in small-scale contingencies, but not operationally suitable.
- In October 2004, the Defense Acquisition Executive approved low-rate initial production (LRIP) for the Nuclear Biological Chemical Reconnaissance Vehicle (NBCRV) and Mobile Gun System (MGS).

SYSTEM DESCRIPTION AND MISSION

Stryker is a family of medium armored vehicles for the Army's Stryker Brigade Combat Team (SBCT). The Stryker Family of Vehicles consists of two basic variants: the ICV and the MGS. The ICV is the baseline vehicle for eight additional configurations. These configurations are the ATGMV, the CV, the ESV, the FSV, the MC, the MEV, the NBCRV, and the RV.

The SBCT is a combined arms team with enhanced strategic deployability capable of immediate employment upon arrival in the area of operations and at the same time, maximize commonality among the vehicle configurations. The SBCT is more strategically deployable than current Army heavy forces, but with greater tactical mobility than current light forces. The Army has designed the SBCT to conduct operations across the depth and breadth of an area of operations, against both traditional and asymmetric adversaries. Though optimized for small-scale contingencies, the Army intends the SBCT to engage in all types of military conflicts, including Major Theater Wars when augmented or when operating as part of a larger force.

TEST AND EVALUATION ACTIVITY



Stryker Family of Vehicles

The Stryker IOT&E took place at Fort Knox, Kentucky, from March-September 2003. Two Stryker companies participated in this evaluation; a third company participated through simulation. Battalion and brigade level assets including reconnaissance, engineer, and anti-tank elements participated in this event. A brigade tactical operations center provided the command and control for this evaluation through the Army Battle Command System. A light infantry battalion was the baseline unit used for comparison. Both the light infantry battalion and the Stryker battalion executed the same scenarios and missions during the IOT&E.

All Stryker configurations, except the MGS and NBCRV, participated in an IOT&E in FY04. During the IOT&E, the MC had a dismounted mortar (designated MC-A). A soft-recoil 120mm mounted mortar vehicle (designated MC-B) underwent developmental testing from June 2003 to January 2004 and an IOT&E in January 2004. Based on lessons learned from a congressionally directed operational evaluation, IOT&E, and LFT&E, the Army initiated a series of improvements before the first SBCT was deployed to Operation Iraqi Freedom. Enhancements included adding FBCB2 to wingmen, adding M1 tanks and an aviation task force, and adding additional contractor logistics support. To enhance survivability, the Army developed an add-on slat armor package as an interim measure because the planned reactive add-on armor was not ready. The Army equipped the first SBCT with slat armor when it deployed in support of Operation Iraqi Freedom.

The Army conducted the LFT&E program on the Stryker family of vehicles (except the MGS and NBCRV) from 1QFY02 through 2QFY04. The program consisted of thousands of firings at armor coupons, hundreds of firings at production-representative Stryker ballistic hulls, and 66 full-up system-level test events. Follow-on testing to qualify additional Modular Expandable Armor System configurations and address Automatic Fire Extinguishing System performance issues has yet to be completed.

Initial Rocket Propelled Grenade (RPG) add-on armor engineering development tests began in FY02. Initial Production Qualification testing began in FY03, resulting in poor armor performance. The SBCT program manager is currently modifying Stryker RPG-level add-on armor to address user concerns. The Army plans to make a limited production decision on the add-on armor in December 2004, and execute adequate testing against the modified add-on armor to support an evaluation of its ballistic performance prior to a full-rate production decision.

MGS and NBCRV

Since the MGS and NBCRV require additional development, the Army separated the MGS and the NBCRV from the main Stryker Test and Evaluation Master Plan (TEMP). Both vehicles are undergoing their own separate acquisition programs and have separate TEMPs.

A preliminary evaluation of the MGS took place in a Limited User Test (LUT) in April and May 2004 at Fort Knox, Kentucky, while developmental testing continued at Aberdeen Proving Grounds, Maryland and Yuma Proving Grounds, Arizona. In October 2004, the MGS developed its own TEMP and began LRIP to support operational testing in 2006. The Army conducted a LUT of the NBCRV configuration from October to November 2003.

The Army also conducted NBCRV Production Qualification Test II (PQTII) from June to August 2004 to validate corrections discovered in the LUT and PQT I conducted in 2003 and to support an LRIP decision. Key tests included sensor performance; automotive safety and performance; environmental testing; electro-magnetic interference; system overpressure testing; and human factors effects. This configuration contains a variety of chemical and biological sensor systems. A side-by-side evaluation of the performance of the Joint Serviced Standoff Chemical Agent Detector and the M21 Remote Sensing Chemical Agent Alarm also took place. This evaluation will support strategies to integrate the appropriate standoff chemical detection system.

The Army intends to complete all MGS and NBCRV LFT&E activity to support their respective Milestone III decisions. The MGS LFT&E program includes 19 system-level test events, and the NBCRV LFT&E program includes 8 system-level test events. Data from the Stryker Family of Armored Vehicles LFT&E program and sub-system-level test phases (integral armor coupon and characterization tests, mission equipment package off-line tests, and Automatic Fire Extinguishing System tests) will complement the dedicated MGS and NBCRV LFT&E programs in evaluating system-specific vulnerabilities.

TEST AND EVALUATION ASSESSMENT

Stryker Family of Vehicles

DOT&E published a classified beyond LRIP (BLRIP) report on the Stryker Family of Vehicles in 2QFY04 based on results for the Stryker Family of Vehicles IOT&E, developmental testing, operational evaluation, and LFT&E. We concluded that the ICV, MC-A, ATGMV, RV, FSV, and CV were operationally effective, suitable, and survivable with limitations for use in small scale contingencies. We assessed the ESV as survivable with limitations for use in small-scale contingencies, but not operationally effective and not operationally suitable. During the IOT, the ESV could not maintain pace with the other Strykers when equipped with the mine plow or mine roller. The mine plow, lane marking system, and mine roller performed poorly, and the overall system is prone to failures. The Army is conducting follow-on operational testing for the ESV. DOT&E will monitor these tests to verify the ESV is operationally effective and suitable. The ATGMV was assessed as not operationally effective as a substitute for the MGS. DOT&E cited 24 recommendations that the Army should consider in order to increase the effectiveness, suitability, and survivability of the vehicles in the family. The Army is currently addressing solutions for 20 of the 24 recommendations.

DOT&E published a classified BLRIP report on the MC-B configuration in September 2004. This evaluation assessed MC-B as operationally effective and survivable with limitations for use in small-scale contingencies, but not operationally suitable due to reliability and safety concerns. The Army has proposed a series of fixes to the problems noted in the BLRIP report. The Army will conduct and DOT&E will monitor a follow-on operational test and evaluation in FY05 to demonstrate that these fixes will work.

MGS and NBCRV

During the LUT, the MGS demonstrated the capability to destroy bunkers and breach concrete walls. The MGS demonstrated poor reliability, excessive weapon system dead-space, and other issues associated with gun sights, main gun fire control, and soldier-machine interface. Based on the initial design tested during the Engineering, Manufacturing, and Development phase, DOT&E identified MGS survivability issues that must be corrected. Survivability concerns include ballistic protection to the crew and the system's mission equipment package.

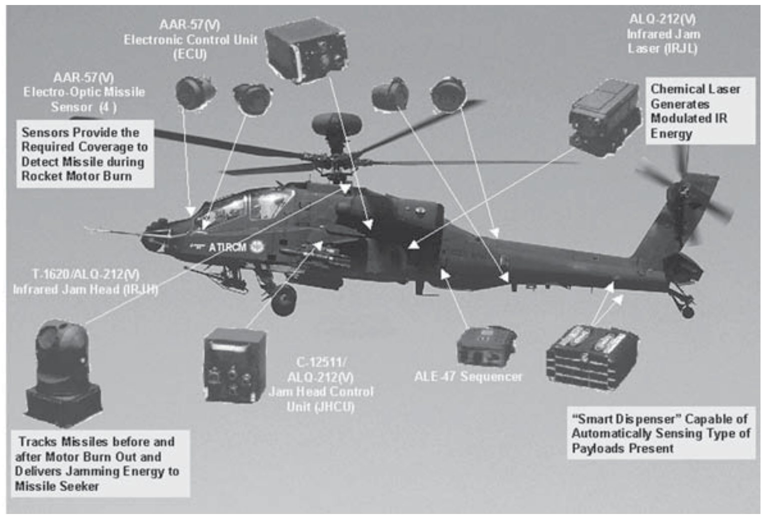
During the LUT and PQT I, the primary NBC sensors comprising the Mission Equipment Package of the NBCRV configuration demonstrated poor detection performance. There were numerous Human Factors Engineering faults, several survivability issues, and the reliability of the system failed significantly to meet requirements. Based on this performance, the Army Test and Evaluation Command rated the NBCRV as not effective, not suitable, and not survivable. Based on PQT II, Human Factors Engineering issues and survivability have improved to the point that further production and testing is warranted. Likewise, two of the three primary NBC sensors have shown improvement in the developmental testing environment since last year, and the Army should continue testing in the NBCRV configuration.

The Stryker MGS and NBCRV LFT&E programs are extremely aggressive, given plans to execute a majority of the component-level and system-level test phases concurrently. A lack of detailed system design, schedule, and resource information introduced additional risk into the development of both the MGS and NBCRV LFT&E strategies.

Suite of Integrated Infrared Countermeasures (SIIRCM) includes: Common Missile Warning System (CMWS), AN/AAR-57 and Advanced Threat Infrared Countermeasures (ATIRCM), AN/ALQ-212

SUMMARY

- The Suite of Integrated Infrared Countermeasures (SIIRCM) includes the Common Missile Warning System (CMWS) missile warning system and the Advanced Threat Infrared Countermeasures (ATIRCM) jam head.
- Acquisition strategy has changed to separate full-rate production (FRP) quantities for the CMWS and ATIRCM systems.
- Plans to ensure adequate testing to support a 3QFY05 FRP are being worked, but are not yet finalized.



The Army intends for the SIIRCM/CMWS to enhance individual aircraft survivability against advanced surface-to-air infrared guided missiles.

SYSTEM DESCRIPTION AND MISSION

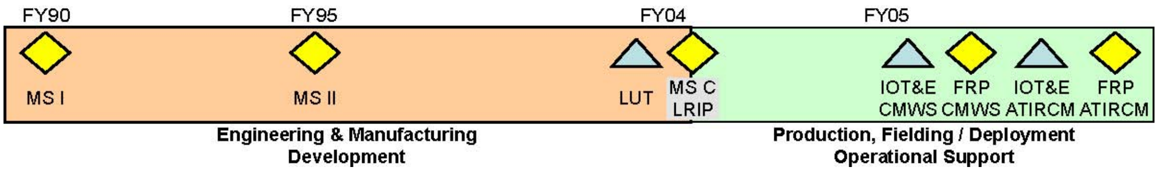
The Army intends for the SIIRCM/CMWS to enhance individual aircraft survivability against advanced surface-to-air infrared (IR) guided missiles. The SIIRCM concept of IR protection includes a passive missile warning system, an active IR jammer, new IR flare decoys, and passive IR features, which include host platform modifications such as engine exhaust/heat suppression and special coatings intended to reduce the platform IR signature.

The ATIRCM, which is a subset of the SIIRCM program, specifically comprises an active IR jammer for use on helicopters and the CMWS. Currently, the initial application of ATIRCM/CMWS will be on Special Operations Command (SOCOM) MH-47 helicopters using only the CMWS plus a countermeasures dispenser and advanced flares. ATIRCM will be installed on Army helicopters starting in FY05.

In response to the September 11, 2001, attacks, and based on the positive test results on CMWS in FY01/FY02, CMWS was recommended for accelerated fielding. As a result, the SOCOM bought 37 CMWS under a limited production – Urgent contract in FY02. Low-rate initial production (LRIP) authority for 59 ATIRCM systems was granted in November 2003. Also, in November 2003, the Secretary of the Army, reacting to the attrition of helicopters in the Middle East, issued direction to equip Army helicopters with modern IR countermeasures as soon as possible. This urgent requirement prompted the need for additional CMWS and resulted in an increased authorization under the LRIP contract for an additional 141 CMWS, bringing the total authorized CMWS to 200. The current plan is to complete the 200-unit buy by early 2005. Total authorization is 1,076 ATIRCM systems.

While the CMWS systems will be fielded on an accelerated schedule, none of the ATIRCM systems will be fielded until the successful completion of the FY04 developmental tests/operational tests and the FY05 ATIRCM Initial Operational Test and Evaluation (IOT&E). FRP for CMWS-only is scheduled for 3QFY05. ATIRCM FRP is scheduled for 4QFY05.

TEST AND EVALUATION ACTIVITY



Four major test events occurred in FY04: two live fire events at Eglin Air Force Base, a User's Test at Concord, New Hampshire, and a Reliability Development Test (RDT) for the upgraded ATIRCM system. The main objective of the User's Test in November 2003 was to determine CMWS performance in an environment that included both simulated missile plume signatures and false alarm sources. Valuable information regarding CMWS's susceptibility to specific false alarm sources, as well as its capability to detect missile plumes at various missile launch ranges was obtained.

During this year, significant planning took place for a major live fire event at the Aerial Cable Car (ACR) facility in late 2004. These tests are required to demonstrate ATIRCM performance subsequent to the major revisions to the system as a result of the problems found in the 2001 tests (i.e., live fire, captive seeker, sled test). Since CMWS is integral to the ATIRCM system, additional data will be obtained on CMWS software upgrades.

TEST AND EVALUATION ASSESSMENT

The key issue for CMWS is to ensure that there is adequate OT&E of the upgraded system to support an FRP decision in 3QFY05. The ACR is the major test event to demonstrate the performance of the upgraded CMWS and ATIRCM systems, but additional testing on the host aircraft is required to ensure that the system can perform in operationally relevant temperature and vibration environments. This needs to be done using missile simulators with the aircraft flying at altitudes representative of the Army's mission profiles. The Army recently added a dedicated CMWS-only IOT&E in 3QFY05 to support testing requirements prior to the CMWS full-rate production decision.

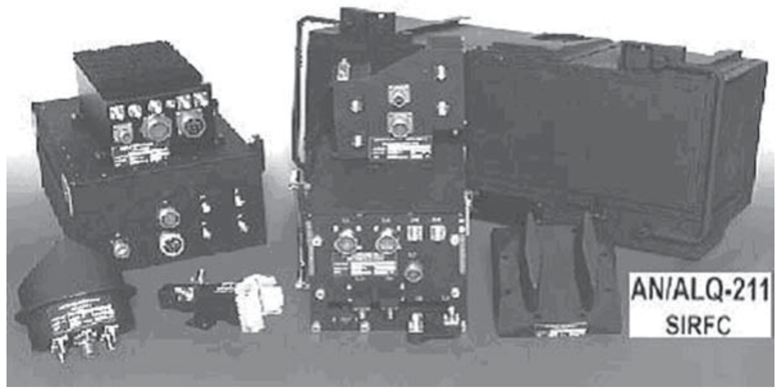
For ATIRCM, the ACR tests in late 2004, the RDT and the IOT&E scheduled in February 2005 should provide sufficient data to assess that system prior to the FRP decision. The Army is developing a data source matrix to help determine test adequacy to support the CMWS FRP.

The first live fire test was conducted during a technology demonstration for next generation missile warning receivers, with CMWS participating as an adjunct to test a major new software upgrade. A serious operational problem was uncovered during these tests, which required additional software modifications. The upgraded software was first tested with the Army's end-to-end model, which emulates the operation of the ATIRCM/CMWS system. The model showed improved performance and subsequent live fire tests at Eglin in July 2004 demonstrated improved system performance.

Suite of Integrated Radio Frequency Countermeasures (SIRFC) (AN/ALQ-211)

SUMMARY

- The Suite of Integrated Radio Frequency Countermeasures (SIRFC) Limited User Test (LUT) in 2001 demonstrated limited radar warning receiver effectiveness but poor jammer effectiveness. The system is currently in a development test phase (following corrective actions from 2001) with Initial Operational Test and Evaluation (IOT&E) planned for late 2005.
- The Test and Evaluation Master Plan (TEMP) and test plans are being drafted. An operational assessment will be conducted in 2QFY05.



The system provides warning (situational awareness), active jamming (self-protection), and when necessary, expendable countermeasures control to defeat threat radar guided weapon systems.

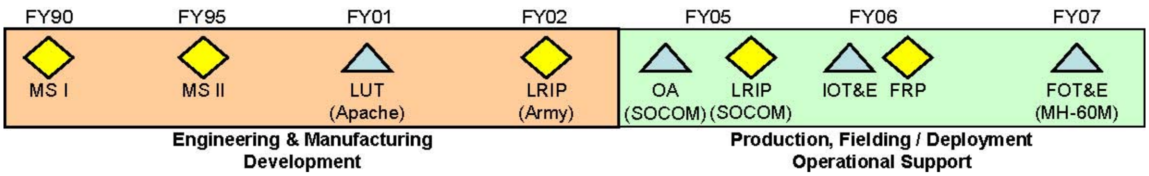
SYSTEM DESCRIPTION AND MISSION

U.S. Army Special Operations Command intends for the SIRFC to be part of an integrated aircraft survivability system that provides warning and countermeasures to ensure optimum protection for the host aircraft. Original plans called for integration of the system on the AH-64D, MH-60K, and MH-47E helicopters, and the CV-22. The lead aircraft for SIRFC integration and test and evaluation was the AH-64D Longbow Apache, but the Army decided that SIRFC is no longer required on that platform. Development continues for Special Operations Command Aircraft, MH-47G, MH-60M, and CV-22.

SIRFC consists of two required sub-systems, the Advanced Threat Radar Jammer and the Advanced Threat Radar Warning Receiver (RWR). The system provides warning (situational awareness), active jamming (self-protection), and when necessary, expendable countermeasures control to defeat threat radar guided weapon systems. Future integration of SIRFC with the Suite of Integrated Infrared Countermeasures on the MH-47G and MH-60M will optimize multi-spectral threat countermeasures for those aircraft. SIRFC achieved Milestone II in FY95 resulting in an Engineering Manufacturing Development contract to produce five test articles supporting test and evaluation through IOT&E.

The government conducted developmental flight tests on the Longbow Apache in July and August 2001 and a LUT in September and October 2001. Analysis of the performance in the developmental test and the LUT indicated that, while SIRFC effectiveness as a RWR was superior to that of other RWRs tested, there were performance deficiencies. Jamming effectiveness in a threat environment was poor. As a result, the Army awarded a correction of deficiencies contract to the system development contractor. The Technology Application Program Office at Fort Eustis, Virginia, assumed test responsibilities following the Army's decision not to continue development other than for Special Operations applications. The Army made a low-rate initial production (LRIP) decision to produce additional units for test and integration on follow-on platforms in May 2002. The corrective actions are being implemented in the LRIP units for further testing. SIRFC, which has not yet undergone an IOT&E, will undergo operational testing, planned for FY06, before the full-rate production decision. However, an additional LRIP-buy of eight systems, based on favorable results from the upcoming developmental tests, is planned prior to IOT&E.

TEST AND EVALUATION ACTIVITY



Test activity in FY04 consisted of laboratory tests at Fort Monmouth, New Jersey, to evaluate performance of corrective actions and incremental software drops, as well as pole tests at Eglin Air Force Base and the Electronic Combat Range at China Lake to optimize electronic countermeasure techniques against the threats. Anechoic chamber testing was conducted at Patuxent River Naval Air Station to characterize installed performance. A Reliability Development and Growth Test has begun, with contractor and governmental developmental flight tests beginning in late 2004.

TEST AND EVALUATION ASSESSMENT

Results of the tests of the upgraded SIRFC have revealed no major problems. True indications of the upgraded SIRFC capabilities and performance will not be available until the government developmental and operational flight tests begin. Planned testing is adequate to support the current acquisition plan.

Surface-Launched Advanced Medium-Range Air-to-Air Missile (SLAMRAAM)

SLAMRAAM is the Army's future short-range air defense weapon system.

SUMMARY

- In September 2003, the Army approved a Milestone B for the Surface-Launched Advanced Medium-Range Air-to-Air Missile (SLAMRAAM) system.
- Subsequently, in December 2003, the Army and the Marine Corps agreed to combine their similar short-range air defense programs into a joint acquisition.
- Since that time, the program has negotiated new contracts, developed an initial draft of a combined requirements document, and drafted a consolidated Test and Evaluation Master Plan (TEMP).

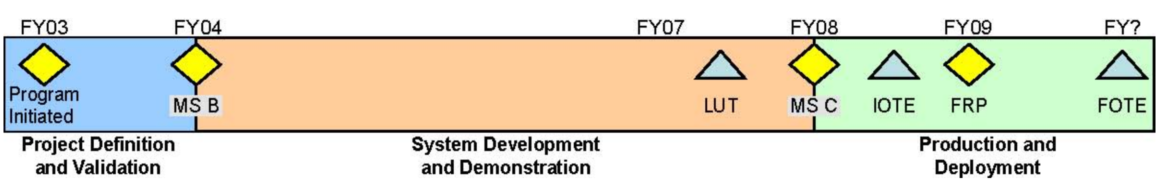
SYSTEM DESCRIPTION AND MISSION

SLAMRAAM is the Army's future short-range air defense weapon system. It will replace four current short-range air defense systems that employ Stinger missiles. SLAMRAAM will counter fixed-wing and rotary-wing aircraft, cruise missiles, and unmanned aerial vehicles. An Army SLAMRAAM platoon will consist of four fire units (also known as launchers), one Integrated Fire Control System Battle Management Command, Control, Computers, Communications, and Intelligence element, and a Sentinel Enhanced Target Range and Classification radar. A SLAMRAAM fire unit will consist of four to six ready-to-fire AIM-120C7 Advanced Medium-Range Air-to-Air Missiles (AMRAAMs) mounted on a High-Mobility Multipurpose Wheeled Vehicle (HMMWV).

The Marine Corps is also developing a HMMWV-based surfaced-launched AMRAAM launcher system called the Complementary Low-Altitude Weapon System (CLAWS). CLAWS will have limited capability for use in emergency operations.

In December 2003, the Army and the Marine Corps agreed to a Joint acquisition of SLAMRAAM and CLAWS. The CLAWS launcher system will be Block 0 for the Marine Corps. The combined program will begin with SLAMRAAM Block 1.

TEST AND EVALUATION ACTIVITY



Both the system contractor and the government will conduct developmental testing in FY06 and FY07. Testing will provide data to assess the contractual requirements in the system performance specifications. Force developmental experimentation in 3QFY07 will support development of soldier crew drills, tactics, techniques, and procedures used to

operate the system on the battlefield. A limited user test (LUT) will support the Milestone C decision, currently scheduled for 4QFY07. Initial Operational Test and Evaluation (IOT&E) will support the full-rate production decision, currently scheduled for 4QFY08. The LUT and IOT&E will evaluate the ability of the SLAMRAAM system to perform its air defense mission. They will include field exercises, acquisition/tracking missions, and live missile flight tests. During the flight tests, SLAMRAAM fire units will launch AIM-120C7 missiles against threat-representative cruise missiles, unmanned aerial vehicles, and rotary-wing targets.

The SLAMRAAM lethality Live Fire Test and Evaluation (LFT&E) strategy will build upon previous AMRAAM lethality testing and live missile firings. It will use validated and accredited AMRAAM models and simulations to assess lethality against the SLAMRAAM aerial target set. If simulations of expected operational engagement scenarios predict large miss distances for any of the threat set, arena testing may be necessary. This arena testing would demonstrate and validate lethality models for the evaluation of effectiveness against those threats.

The user does not require the SLAMRAAM fire unit to include crew protection features, so DOT&E determined that it is not a covered system for survivability LFT&E. Due to experience in Operation Iraqi Freedom, DOT&E is strongly encouraging the Army to add crew protection to the fire units as a threshold requirement. The Army agreed to complete an assessment of vulnerability issues related to the expected ground threats to the SLAMRAAM system. The Air Force and Navy have conducted insensitive munitions testing of AMRAAM. The SLAMRAAM operational environment includes threats from small arms, mortars, and artillery that are not present in the AMRAAM operational environment. As a result, additional insensitive munitions testing will be required.

The program has hosted a number of meetings and working groups to develop a Milestone C TEMP by January 31, 2005.

TEST AND EVALUATION ASSESSMENT

SLAMRAAM Milestone B occurred in 4QFY03 without a TEMP approved by DOT&E. DOT&E did not approve the Milestone B TEMP because the proposed operational test and evaluation program would not have adequately tested and evaluated the system.

The program's currently proposed test strategy is high-risk. It relies heavily on modeling and simulation, and includes only an eleven-missile flight test matrix. The program may have to repeat flight test failures experienced in developmental test or developmental/operational test prior to entering IOT&E. The program will demonstrate many flight test objectives for the first time during IOT&E.

An adequate LFT&E lethality assessment will require AMRAAM fuzing information against the threat set and high-fidelity target vulnerability models of these threats. Much of this information, and many of these models, do not exist, and must be collected and developed.

Transportation Coordinator's Automated Information for Movement System II (TC-AIMS II)

SUMMARY

- Transportation Coordinator's Automated Information for Movement System II (TC-AIMS II) Block 2 conducted an Initial Operational Test and Evaluation (IOT&E) and a full retest in FY04. The Army Test and Evaluation Command (ATEC), the lead operational test agency, determined that TC-AIMS II Block 2 is not operationally effective or suitable.
  - The system does not interface with all required systems for the Army and Navy.
  - The system is too complex for the general purpose Army user.
- The Program Office and the User Representative have adopted materiel and concept of operations (CONOPS) changes to address development shortcomings.
- ATEC witnessed demonstrations conducted by the Program Manager and, based on these demonstrations and proposed CONOPS changes, revised its assessment and finds Block 2 to be effective and suitable.

TC-AIMS II Block 2 automates the processes of planning, organizing, coordinating, and controlling unit deployments, sustainment, and redeployments.

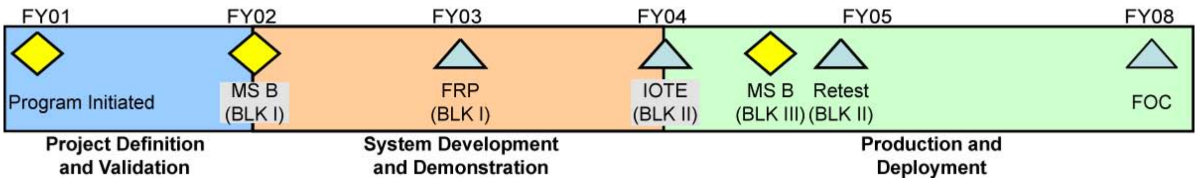
SYSTEM DESCRIPTION AND MISSION

TC-AIMS II Block 2 reduces the buildup time in the movement of materiel and personnel and integrates current Service-unique transportation information systems into a single joint system. TC-AIMS II Block 2 automates the processes of planning, organizing, coordinating, and controlling unit deployments, sustainment, and redeployments. TC-AIMS II Block 2 interfaces with installation, unit, and depot-level supply systems, the Global Transportation Network, and the Joint Operational Planning and Execution System. In its current configuration, the system provides a means for transportation personnel at the unit level to receive the tasking for deployment of their unit, match assigned personnel and equipment to the requirements, provide the information to higher headquarters in a standard deployment format, and then prepare their unit for movement, to include producing shipping labels and tags. Future TC-AIMS II Block 3 enhancements will automate movement control and the reception, staging, onward movement, and integration at the gaining theater. The Program Manager plans an evolutionary acquisition strategy in periodically releasing "blocks" of increasing functionality.

TC-AIMS II has a history of failing to meet standards for operational testing. Block 1 conducted a series of operational tests and retests that culminated in 2002, with an ATEC determination that TC-AIMS II Block 1 was operationally effective, suitable, and survivable for the Navy, but not for the Marine Corps or a large portion of the Army or Air Force. DOT&E concurred, and Block 1 was fielded to the Navy, to U.S. Army-Europe, and to a single Army brigade at Fort Lewis, Washington.

The TC-AIMS II Block 2 acquisition has suffered from the lack of a common unit movement process across the Services and the absence of a single, authoritative user representative. During 2003, the Joint Forces Command became increasingly active in this area, but there is still no joint unit movement process, or even a single process within the Army (the largest user). This has presented the Program Manager with the difficult task of building a single system that is expected to satisfy the separate requirements of all four Services.

TEST AND EVALUATION ACTIVITY



DOT&E approved an updated Test and Evaluation Master Plan and a Block 2 OT&E test plan in July 2003. ATEC conducted Army operational testing at Fort Lewis, Washington, in August 2003 and operational testing for the Navy in October 2003. Results of both tests were unsatisfactory based on problems identified and not corrected from developmental testing and previous operational tests. ATEC extended the first IOT&E to give the Program Manager an opportunity to demonstrate program fixes in November 2003. This additional phase also produced unsatisfactory results.

On review of the operational testing results, the Milestone Decision Authority directed a retest. DOT&E approved the plan for the retest; the Army completed testing in April 2004 and the Navy completed testing in June 2004. As a result of the retest, ATEC determined that the TC-AIMS II Block 2 system is

- Not effective.
- Not suitable for the Army.
- Suitable for the Navy.
- Survivable.

In July 2004, ATEC briefed the test results to the user. The Program Office and user representative identified needed system improvements and workarounds. In September 2004, the Program Office conducted a demonstration of system improvements and proposed CONOPS changes. ATEC subsequently revised its assessment and finds Block 2 to be effective and suitable.

TEST AND EVALUATION ASSESSMENT

The TC-AIMS II Block 2 did not perform favorably during operational testing in 2003, resulting in a retest planned and conducted in 2004. DOT&E approved the plan for the retest. The Army portion of the operational test was conducted with a mobilizing National Guard Brigade at Camp Beauregard, Louisiana, in April 2004, and Navy testing was conducted at Norfolk in June of 2004. These tests were adequate to assess system effectiveness, suitability, and survivability in an operationally realistic environment.

Although the Block 2 system has considerably improved over Block 1, the tests showed a number of critical mission functions do not perform to the threshold standard. The Program Office subsequently conducted a demonstration of some corrective measures to improve operator interface and User-adopted CONOPS changes. The demonstration of these improvements, however, was not part of an approved operational test plan, and was not adequate to satisfactorily redress noted shortcomings.

DOT&E will continue to monitor and assess the TC-AIMS II Block 2 testing, and work with the acquisition community through the Integrated Product Team process.

UH-60M Black Hawk

SUMMARY

- The UH-60M program intends to rebuild and modernize the Black Hawk fleet. Improvements include a digital cockpit, modernized engine and power train, and a semi-monocoque airframe with selected machined metal airframe components.
- In the past year, the program began developmental flight-testing of two prototype aircraft.
- Early developmental testing is producing encouraging results for aircraft performance and cockpit design. The aircraft's ability to attain reliability growth goals by Milestone C or the full-rate production decision is a concern.

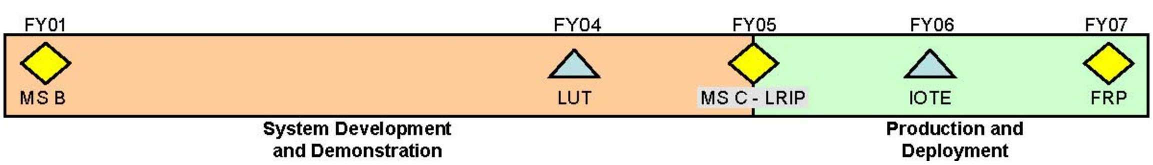
Early developmental testing is producing encouraging results for aircraft performance and cockpit design.

SYSTEM DESCRIPTION AND MISSION

The UH-60 Black Hawk is a single rotor medium-lift helicopter. The aircraft provides utility and assault lift capability in support of air assault, general support, and aeromedical evacuation missions. The aircraft also has the capability to perform command and control, electronic warfare, and special operations missions when in the appropriate configuration. The prime contractor is Sikorsky Aircraft.

The Operational Requirements Document, approved in March 2001, establishes a blocked approach to development and modernization. The Army intends the near-term UH-60M Block 1 aircraft to provide a digital cockpit, extended service life, and performance and reliability levels equivalent to, or better than, the UH-60L. The UH-60M digital cockpit will feature a four Multi-Function Display (MFD) design by Rockwell Collins. Cockpit enhancements are to improve pilot situational awareness and enhance communications, navigation, and survivability. Block II capabilities will add performance improvements to lift and range capability beyond that of the UH-60L. The UH-60M is a covered program for live-fire test and evaluation (LFT&E). A waiver from full-up, system-level testing requires the program to execute an alternate plan to meet the LFT&E requirements.

TEST AND EVALUATION ACTIVITY



In the past year, the program began developmental flight-testing of two prototype aircraft at the Sikorsky flight test facility. Since first flight on September 17, 2003, the two aircraft have accumulated over 360 test flight hours. Flight-testing is focusing on performance and flight-envelope expansion, fuel consumption, vibrations, loads, handling qualities, and reliability. The Army plans for software development to occur in Builds for increased capabilities. The current software configuration in the aircraft is Build B. Build B provides sufficient functionality for flight-testing, but does not include advanced avionics systems such as the digital moving map and digital messaging.

Integration and testing of advanced avionics is taking place in the System Integration Laboratory in Huntsville, Alabama. The most significant test of software Build C, incorporating the advanced avionics systems, took place during a Limited User Test (LUT) in August 2004. Using a UH-60M non-motion cockpit simulator, experienced Army pilots conducted six utility helicopter mission scenarios. Primary areas of evaluation were pilot-vehicle interface, workload, and situational awareness. This event also provides an opportunity to evaluate the maturity of procedures for employment of aviation platforms in a digital battlespace.

The Army and the Navy are conducting a coordinated LFT&E effort. This effort includes testing for the UH-60M and the Navy's MH-60S and MH-60R programs. This combined test effort intends to reduce costs and compress schedules. The integrated LFT plan takes into account vulnerability reduction features incorporated on the aircraft since its initial fielding in 1978. This plan also uses recent combat damage experience and subsystem qualification efforts. Complete ballistic testing includes static and dynamic testing. Testing will focus on the main and tail rotor blades, the engines, the vertical tail pylon, several flight critical rotor drive and flight control components, and the entire fuel system. Several tests are pending for the Improved Crashworthy External Fuel System, the Medical Evacuation OnBoard Oxygen Generating System, the fire detection/suppression system, the improved durability gearbox, and the new Wide Chord Main Rotor Blades. An operational, but not flight-worthy, YCH-60 prototype is serving as the primary production representative full-up system ground test vehicle. Army updates of earlier vulnerability assessments are more representative of the latest design configuration.

TEST AND EVALUATION ASSESSMENT

Early developmental testing is producing encouraging results for aircraft performance and cockpit design. However, the aircraft's ability to attain reliability growth goals at either Milestone C or the full-rate production decision is a concern. Technical risks for the UH-60M program remain for the structural design of the airframe and system integration. The approved UH-60M test program will provide the opportunity to evaluate these technical issues and determine the effectiveness and suitability of the helicopter.

Based on performance testing and analysis, the UH-60M appears poised to meet or exceed requirements for payload and range. Test pilot feedback is favorable for the improved handling qualities in comparison to UH-60A/L aircraft. The UH-60M provides the capability to maintain a constant heading, altitude, and speed without pilot inputs to the controls. This "autopilot" feature reduces pilot fatigue and workload, as reported following an 8-hour ferry flight from Colorado to Alabama. A "go around" flight control feature to address recent brown out conditions experienced by pilots in Iraq and Afghanistan will also increase safety and mission accomplishment.

Initial loads and vibration testing of the UH-60M confirms that there is a structural weakness in one of the newly-design cabin frames. This problem is consistent with a fatigue problem discovered on the Navy's SH-60R aircraft structure that was the baseline for design of the UH-60M. Until corrected, the stresses in the frame under heavy loads and/or aggressive maneuvers will, over time, lead to cracking in the aircraft frame.

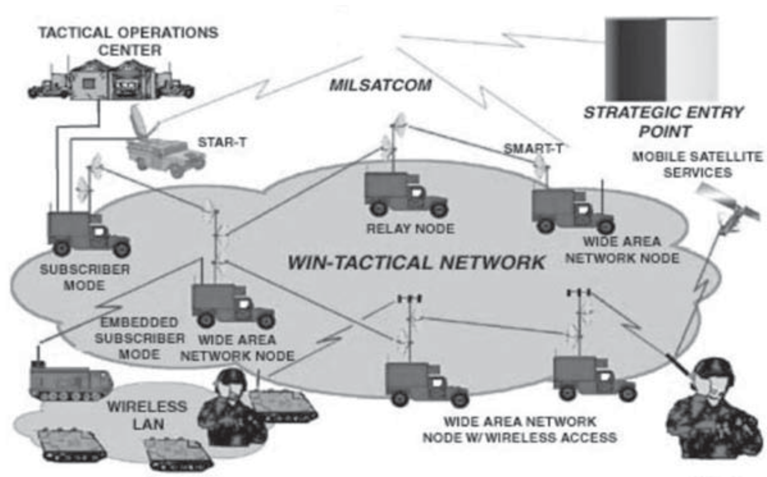
A LUT during August 2004 in the System Integration Laboratory concluded that the digital map and navigation aids in the UH-60M cockpit enhance pilot situational awareness and mission flexibility. UH-60M pilots demonstrated the ability to fly the designated routes, avoid ground threat systems, and respond with confidence to unexpected mission changes while in flight. Digital messaging capabilities enabled coordination of detailed mission plans that are difficult to coordinate by voice radio. The LUT also uncovered a few situations in which the design of the software and controls can lead to pilot error or confusion when the pilot interface for the Joint Variable Message Format messaging and the Flight Management System do not compare notification information properly.

LFT&E to date includes both component static testing, and full-up system-level dynamic testing of the main and tail rotor blades, the engines, fuel system, tail structure, and several rotor drive and flight controls components. Test results for the improved components tested to date are showing increased survivability.

Warfighter Information Network-Tactical (WIN-T)

SUMMARY

- The Warfighter Information Network–Tactical (WIN-T) system supports the Army's vision to accelerate fielding beyond line-of-site communications to deployed units.
- In October, the Defense Acquisition Executive approved combining the two competing development contractors into a single contract team.
- General Dynamics is the prime and Lockheed Martin is the major subcontractor.
- The Army will conduct an IOT&E in 1QFY09 with the first unit equipped.
- DOT&E approved the Test and Evaluation Master Plan June 2003, which will be updated to reflect recent program changes.



The WIN-T system supports the Army's vision to accelerate fielding beyond line-of-site communications to deployed units.

SYSTEM DESCRIPTION AND MISSION

WIN-T is the Army's tactical Intranet. It is designed to optimize network operations and provide deployed combatant commanders with the capability to perform multiple missions simultaneously using WIN-T high speed and high capacity backbone communication network. WIN-T supports communications from the sustaining base down to the unit of action.

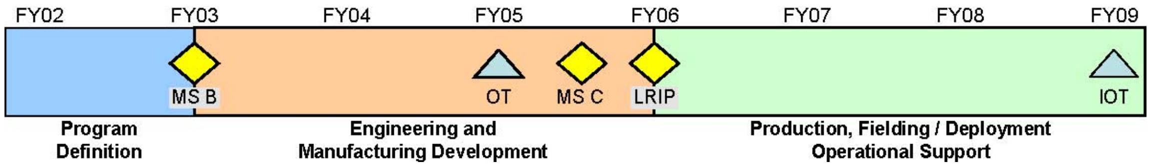
WIN-T is the Army's communications network of the future. It will replace Tri-Service Tactical Communications and the Mobile Subscriber Equipment, and will incorporate recent Army initiatives to acquire commercial satellite access and off-the-shelf communications systems in support of the global war on terror. The Joint Network Transport Capability is a WIN-T-like program, and it is being fielded to Operation Iraqi Freedom 3 units rapidly. It provides commercial satellite access and commercial off-the-shelf systems to satisfy bandwidth and network services demands.

WIN-T supports the Mobile Battle Command by integrating capabilities into maneuver platforms and supports dispersed operations over increased distances. WIN-T integrates terrestrial, airborne, and military satellite-based capabilities into a network infrastructure to provide connectivity across an extended non-linear battlespace.
These three components of the integrated WIN-T network consist of:

- The terrestrial layer components are the Joint Tactical Radio System (JTRS) Cluster 1, the personal communications device, and the secure wireless local area network.
- The airborne layer consists of unmanned aerial vehicles or tethered air vehicles with the WIN-T airborne communications node to provide beyond line-of-sight communications.
- The space layer includes commercial and military satellites such as the Wideband Gapfiller or Advanced Extremely High Frequency satellites to provide reach-back to home stations via the Global Information Grid.

WIN-T was originally envisioned to support the Army's Future Combat System, Future Force with an initial fielding in the FY09 timeframe. The global war on terrorism shifted the Army's focus to the current force. The Army lessons learned from Operations Enduring Freedom and Operations Iraqi Freedom revealed that the Army requires a WIN-T-like capability now. In order to achieve that capability, WIN-T combined the two contractors into a single contract. Combining the two contracts will allow early convergence to one architecture and will allow the Army to bridge the current and future force.

TEST AND EVALUATION ACTIVITY



DOT&E will monitor development of the WIN-T test and evaluation strategy to ensure that it meets the requirements of the WIN-T program and supports the Army's evolving test strategy for other systems in development, such as JTRS Cluster 1 and Future Combat System. Test planning will focus on development of an adequate test strategy in preparation for the developmental test/operational test.

TEST AND EVALUATION ASSESSMENT

DOT&E and the Operational Test Agencies involvement are necessary to understand the demonstrated performance of the Joint Network Transport Capability Spiral during the rapid fielding efforts to Operations Enduring Freedom and Operations Iraqi Freedom bound units. WIN-T planning for the developmental test/operational test in 3QFY05 is on schedule.

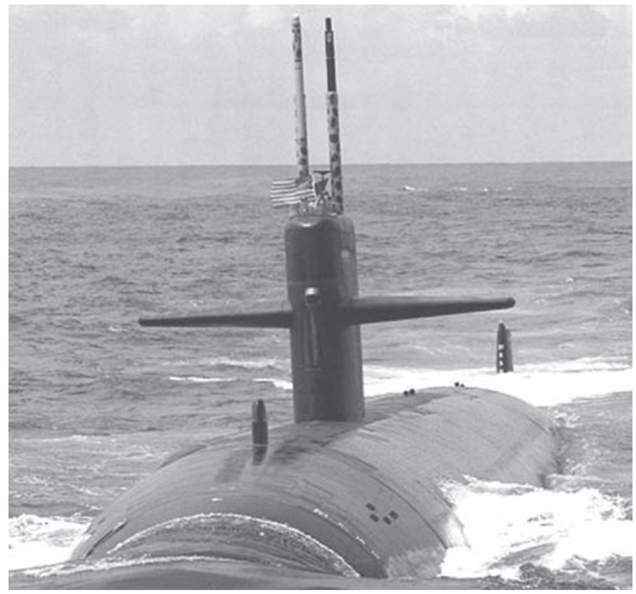
Navy Programs

Navy Programs

Acoustic Rapid COTS Insertion (A-RCI) AN/BQQ-10 (V) Sonar System

SUMMARY

- The Navy is revising the Acoustic Rapid Commercial Off-the-Shelf Insertion (A-RCI) Test and Evaluation Master Plan (TEMP) to update the test concept and to incorporate using Capability Development Documents (CDD) and Capability Production Documents (CPD). The revised TEMP and CDDs/CPDs should be approved in FY05.
- The Navy intends to complete a new Advanced Processing Build (APB) for A-RCI each year. Plans are to observe testing throughout the development process and to conduct an operational test on each variant.
- A-RCI APB-00 Phase III and Phase IV completed operational evaluation (OPEVAL) in September 2003. The Navy has not operationally evaluated A-RCI APB-01, APB-02, and APB-03.
- A-RCI APB-00 did not meet its effectiveness or suitability thresholds. However, A-RCI is an improvement over existing legacy systems.
- The Navy continues to deploy submarines with A-RCI APB systems that have not completed operational testing.



A-RCI uses installed legacy sensors and replaces central processors with COTS personal computer technology and software installed in an open architecture.

SYSTEM DESCRIPTION AND MISSION

The Navy initiated the A-RCI AN/BQQ-10 (V) Sonar System as Engineering Change 1000 to the AN/BSY-1 Combat System on improved *Los Angeles* class submarines. The concept uses installed legacy sensors and replaces central processors with COTS personal computer technology and software installed in an open architecture. A-RCI allows for faster, more economical, and more frequent hardware and/or software upgrades. The program expanded to provide improvements that could be back-fit into all nuclear attack (SSN) and ballistic missile (SSBN) submarines totaling over 60 ship sets.

These improvements provide expanded capabilities, particularly in littoral waters, for covert intelligence collection and surveillance and covert insertion and support of Special Forces. Expanded capabilities for anti-submarine warfare focus on diesel-electric submarines, covert mining, and covert strike of targets ashore. Specific software improvements include passive ranging, spatial vernier processing, full spectrum processing, dual towed array concurrent processing, low frequency active interference rejection, passive broadband, passive narrowband and passive detection, tracking processing, track management, onboard training, and port/starboard ambiguity resolution.

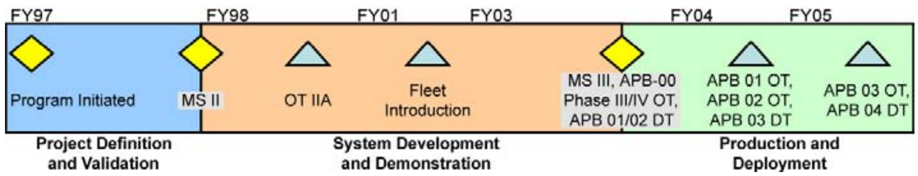
The operational test and evaluation plan for A-RCI features four phases followed by periodic testing as evolutionary upgrades are made to the hardware and/or software. A-RCI Phase I added initial improvements to the towed array processing and added the TB-29 towed array.

Phase II was the first implementation of the towed array improvements. When DOT&E placed the program on oversight in 2001, Phase II testing was already underway. The Navy provided insufficient submarine test resources for Phase II, resulting in the deployment of Phase II equipped ships without operational testing. The Navy did not complete Phase II testing due to repeatedly cancelled tests and equipment failures. As a result, Phase II evaluation was conducted in conjunction with Phase III and Phase IV testing.

Phase III is a major replacement of the sonar processing hardware and software for the towed array, hull array, and the spherical array. The Navy certified Phase III for testing in March 2002.

Phase IV is an upgrade to the high frequency mine hunting and ice avoidance sonar. The Navy certified Phase IV for testing in August 2002. APB-00 was the baseline version for A-RCI Phase III and Phase IV testing. The Navy's plan is to develop and release software improvements, called APB, annually and to update equipment, called Technology Insertions (TI), every other year. Currently APB-01, APB-02, APB-03, and TI-02 are in development.

TEST AND EVALUATION ACTIVITY



A-RCI Phase IV OPEVAL testing completed in February 2003. A-RCI Phase III OPEVAL testing completed in September 2003. The Navy continued to develop improvements to A-RCI and developed APB-01, APB-02, and APB-03 software upgrades and TI-02 technology insertion to A-RCI. The Navy has not certified these upgrades ready for operational testing. Poor system reliability, delays in APB software development, installation and integration problems, and a lack of test assets prevented evaluation of these upgrades. To gain insight into system performance, the Commander, Operational Test and Evaluation Force (COMOPTEVFOR) is observing development testing on system upgrades in the laboratory and at sea.

Detailed planning for the subsequent testing of scheduled APB upgrades was a priority during 2004. Significant effort to integrate at sea testing with other scheduled operations has resulted in some developmental test system performance observations. Draft CDD and CPD documentation for each of the upgrades has been prepared and reviewed.

TEST AND EVALUATION ASSESSMENT

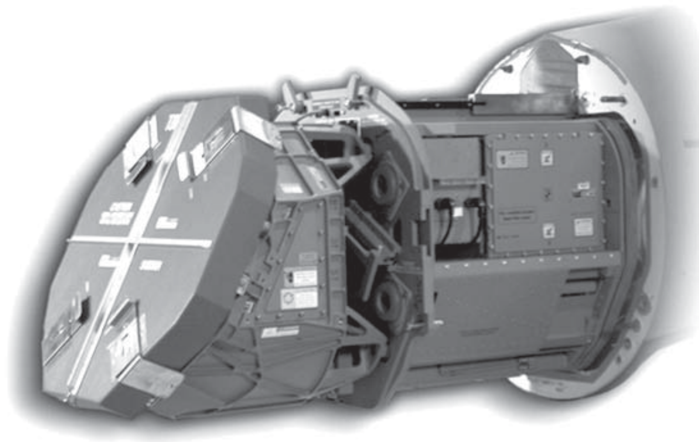
COMOPTEVFOR found the Phase III systems to be effective, but not suitable, and the Phase IV systems to be not effective and not suitable. DOT&E agrees with the suitability assessments. However, using the OPEVAL data, Phase IV met 94 and 111 percent of the two detection performance thresholds, while Phase III achieved only 127, 73, and 34 percent of its three search performance thresholds. Phase IV performance is clearly better than the legacy system it replaced. The Phase III superiority is less clear, particularly when operating in some environments and in the areas of target classification and localization.

The procurement, installation, and deployment of A-RCI Phase II, III, and IV systems continued in 2004 despite the lack of operational testing of the latest APBs. In addition, complete developmental testing and reporting on the newer builds has not occurred. Currently 24 (plus) submarines have A-RCI versions (APB-01, 02, 03, or TI-02) installed that have not been operationally tested. The Navy should work with COMOPTEVFOR and operational commanders to complete these tests. New ship set installations continue to have integration problems with legacy systems as well as continued reliability, crew training, and documentation issues. Navy development of new APBs should be event-based to ensure lab and development testing, crew training, and operational testing and evaluation are completed and major deficiencies addressed before fielding the next APB.

Advanced Electronically Scanned Array (AESA) Radar

SUMMARY

- The Advanced Electronically Scanned Array (AESA) radar is demonstrating as good as, or better than, predicted mapping and target detection performance against ground targets.
- Initial performance against airborne targets is encouraging.
- Software delivery is behind schedule, but the program office and Raytheon (the contractor) are addressing the problem. Enough time is available to recover the schedule.
- The Test and Evaluation Master Plan, approved in September 2004, is adequate.



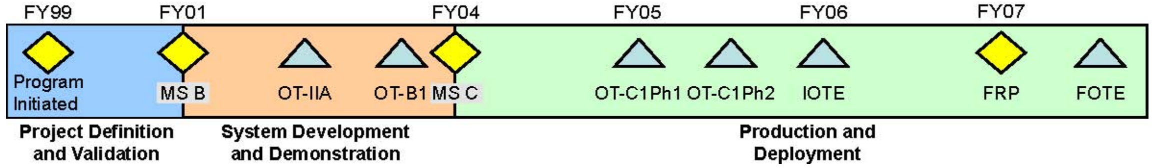
The APG-79 AESA radar system is an upgrade to the F/A-18 E/F Super Hornet and replaces the APG-73 mechanically scanned array radar.

SYSTEM DESCRIPTION AND MISSION

The APG-79 AESA radar system is an upgrade to the F/A-18 E/F Super Hornet and replaces the APG-73 mechanically scanned array radar. The radar employs a fixed antenna array composed of hundreds of transmit and receive modules. Each transmit and receive module has its own low noise amplifier that separately amplifies the transmitted radio frequency waveforms. The sum of the transmitted energy from the transmit and receive modules is significantly greater than that of the APG-73 radar, and the failure of a single module only slightly reduces system performance while the radar system continues to function. Thus, system reliability should be much better than a mechanically scanned antenna system such as the APG-73.

The main advantages the APG-79 radar will provide are increased detection range; increased survivability through reduction of own radar cross-section and a decrease in emissions; simultaneous use of air-to-air and air-to-ground modes; and correction of deficiencies in electronic attack and electronic protection performance of the APG-73. Radar beam steering algorithms in the aircraft mission computers enable both the rapid repositioning of the radar main-beam, called beam agility, and the interleaving of operational modes such as air-to-air and air-to-ground. The mission computers also allow the simultaneous performance of tasks such as tracking multiple targets while providing data-link guidance to missiles in flight. The radar also uses an optical fiber channel in lieu of a traditional electronic bus and employs both ADA and C programming languages for data processing and signal processing, respectively. The prime contractor for the radar is Raytheon Radar Systems, El Segundo, California.

TEST AND EVALUATION ACTIVITY



The Navy will conduct operational testing of the APG-79 radar in five phases: OT-IIA, OT-B1, OT-C1 Phase 1 and Phase 2, and OT-C2 (Operational Evaluation). OT-IIA and OT-B1 are complete. The test strategy includes the operational test community through continuous DT assist flights, and relies heavily on the use of modeling and simulation in the early phases of testing. In keeping with this strategy, much of the early operational assessment focused on validating

the data used to feed the performance models and simulations, since little radar functionality was available for the early operational test phases.

In February 2003, the Navy conducted the OT-IIA operational assessment at the Raytheon Radar Systems Integration Lab. No actual flight-test occurred and only the real beam map mode of the radar was available for this assessment. In the fall of 2003, the Navy's operational test squadron, VX-9, conducted OT-B1 with the first Engineering and Manufacturing Development radar installed in an F/A-18F. Test crews made several synthetic aperture radar (SAR) maps and evaluated the hardware and the cooling system. In early 2004, the Navy installed a second APG-79 radar in a second F/A-18F and used it for developmental flight-testing. A third aircraft with APG-79 became available in September 2004.

The Navy began OT-C1 Phase 1 in October 2004. Several SAR imaging modes were available as well as some, albeit very limited, air-to-air functionality. OT-C1 Phase 2, scheduled for the spring of 2005, should demonstrate a more robust air-to-air capability.

TEST AND EVALUATION ASSESSMENT

During OT-IIA, Navy test personnel made a map of nearby Catalina Island using the real beam map mode on the land-based radar at Raytheon's Radar System Integration Lab facility. Test crews assessed the quality of the map and the accuracy of coordinates as excellent. In addition, Raytheon presented extensive laboratory data to support their claims of the radar model's predictions of performance.

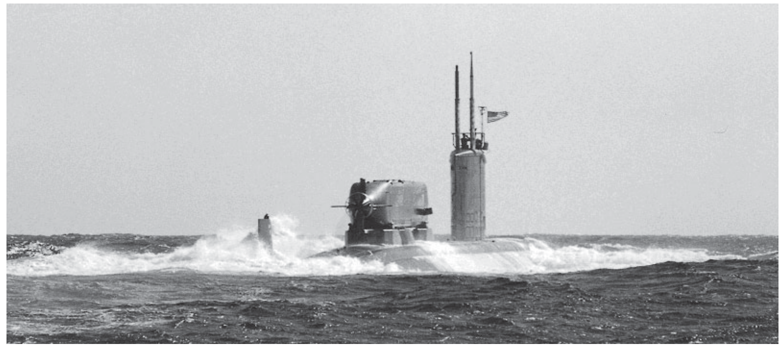
During OT-B1 flight-testing, the operational test aircrew made several SAR maps. Although immature signal processing did not allow the level of detail in the maps expected in operational deployment, the aircrew assessed the basic resolution as excellent.

Developmental testing is advancing. Many of the radar's operational modes are available much earlier than expected. However, a large number of software anomalies are keeping the software coding workload high and the program is about three months behind schedule. Most of the delay is due to system "lock-ups" caused by poor understanding of the hardware and the complex system architecture. However, the development timeline has sufficient buffer to absorb this delay, the program office and contractor are addressing the issue, and DOT&E expects progress will accelerate in the next six months. Another source of concern is the inability to use the high-resolution "SAR-4 mode" maps for target identification (e.g. distinguish aircraft type on a tarmac, or identify an individual building from others in close proximity in a complex target environment). In its current form, SAR-4 takes significantly longer to collect and, in most cases, it does not offer enough of a noticeable improvement over SAR-3 to be worth the time trade-off in the cockpit. This issue remains a future source of risk. Initial radar detection ranges of airborne targets are consistent with the modeling and simulation predictions computed by Raytheon and significantly lower the development risk in this area.

To date, there is little data on the suitability aspects (reliability, maintainability, and availability) of the radar, and the program continues to use models based on previous systems to predict this performance while collecting sufficient data.

Advanced SEAL Delivery System (ASDS)

SUMMARY



The ASDS is a combatant submersible for transporting Special Operations Forces.

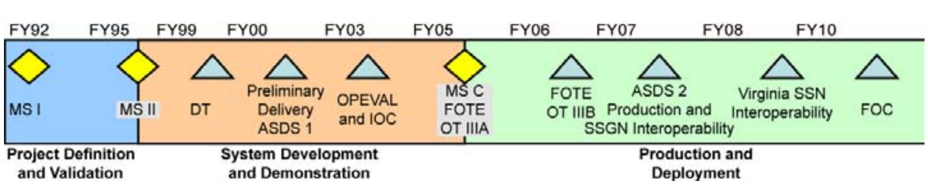
- The Advanced SEAL Delivery System (ASDS) is an improvement over existing SEAL delivery vehicles; however, ASDS is not operationally effective for all the full mission operational profiles required in the Operational Requirements Document. ASDS is not operationally suitable due to poor availability, poor reliability, and poor maintainability. The ASDS hull meets underwater shock specifications, however, there are problems with hull-mounted components and crew protection. The program office is addressing ASDS problem areas. Classified details are covered in DOT&E's beyond low-rate initial production (BLRIP) report issued April 29, 2004.
- The Test and Evaluation Master Plan (TEMP) is under revision to address the correction and retesting of deficiencies identified in the operational evaluation and during fleet operations.
- The U.S. Special Operations Command delayed the Milestone C limited production decision until FY05 to allow for the correction and testing of deficiencies.
- The Navy placed ASDS in service and considers ASDS a fleet asset. ASDS sustained mission failure damage during a fleet exercise and again during pre-deployment workup testing.

SYSTEM DESCRIPTION AND MISSION

The ASDS is a combatant submersible for transporting Special Operations Forces. The ASDS Program includes the ASDS submersible vehicle, the land transport vehicle; host submarine support equipment; and logistics, training, and support documentation.

ASDS provides Special Operations Forces personnel and equipment a one-atmosphere, dry environment. Modified submarines of the *Los Angeles, Seawolf*, and *Virgina* classes and the SSGN variant of the *Ohio* class can carry the ASDS. ASDS has a full communications suite; a deployable periscope for optical sighting and recording of video and still pictures; and forward-looking sonar for navigation, and collision avoidance. Two pilots, a submariner in command and a SEAL co-pilot, crew the ASDS. The submersible can carry greater than five persons to their mission area and can serve as their forward base of operations. High-endurance silver-zinc batteries provide onboard power. ASDS displaces 60 tons, has a beam of 6.75-feet, a height of 8.25-feet, and overall length of 65.2 feet. A 62-horsepower electric motor driving a rear propeller provides forward propulsion and two forward and two aft thrusters allow fine maneuvering.

TEST AND EVALUATION ACTIVITY



Despite limitations identified in operational testing, the Navy and Special Operations Command placed ASDS in service in 2003. Operational test and evaluation of ASDS did not occur in 2004; however, in-service performance indicates the vehicle is less rugged than required.

In late 2003, ASDS participated in a Fleet Exercise. The exercise involved transporting ASDS on a C-5 aircraft, certifying the ASDS and a host submarine to conduct operations, and completing an ASDS operational Special Operations Forces training exercise. While returning from the exercise site, the ASDS sustained damage to its stern planes, propeller shroud and propeller. The Navy's investigation of the incident attributed the cause to improper maintenance. The Navy changed the maintenance procedures and improved the design of the propeller and stern plane couplings to prevent recurrence of this failure. ASDS returned to service in April 2004.

In June 2004, the Navy conducted retesting of repairs to the ASDS. During the test, the ASDS propeller shroud broke off causing damage to the ASDS's propeller. The Navy's investigation revealed improper manufacturing of the shroud. Navy modeling and measurements also indicated unstable seawater flow exists around the aft end of ASDS and causes unplanned cyclic stresses on the aft end components. The Navy is evaluating the effects of the cyclic stresses and is evaluating operating the ASDS without the propeller shroud.

In May 2004, the Navy selected a new battery design. The selected Lithium Ion battery could solve problems with meeting battery turnaround time and cycle life requirements. This new design battery should be ready for testing in the summer 2005.

DOT&E worked with the Navy to define the ASDS Live Fire Test and Evaluation (LFT&E) program and to evaluate its vulnerability using finite element modeling analyses. DOT&E approved the LFT&E Management Plan in December 2003. Subsequently, the Navy submitted the waiver for full-up system level testing to Congress in February 2004.
A revision to the TEMP to address the correction and retesting of deficiencies identified during operational testing and fleet operations is in progress and should complete in 2005.

TEST AND EVALUATION ASSESSMENT

DOT&E delivered the BLRIP report to Congress in April 2004 (which also contains the classified data). That report stated:

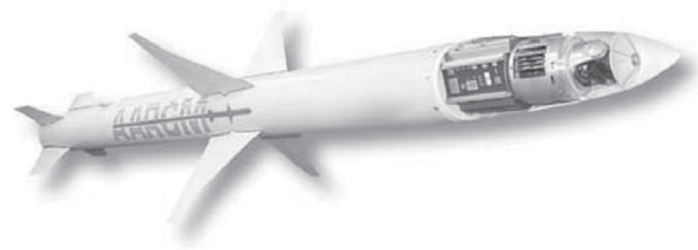
- Testing was adequate to evaluate the current state of development of ASDS.
- Demonstrated performance necessitates retesting after ASDS main battery replacement and correction of other problems.
- ASDS is an improvement over the existing SEAL Delivery Vehicles.
- ASDS is operationally effective for short range and duration missions and for some mission profiles; however, it is not effective for all the mission and threat profiles desired by the user in the Operational Requirements Document.
- ASDS's noise problems must be fixed and the acoustic signature re-measured.
- ASDS is not operationally suitable due to low availability, low reliability, and low maintainability.
- Low Silver Zinc battery in-service life and the long time needed to recharge the battery drove the unsuitability determination.
- ASDS also experiences recurring low electrical grounds and mechanical pump failures.
- Results of finite element modeling studies indicate the ASDS hull meets underwater shock specifications for resistance to hull rupture; however, there are problems with the hull mounted components and crew protection.

Pending the development and installation of the Lithium-Ion Battery, the Navy and U.S. Special Operations Command are operating the ASDS at sea. These operations indicated a lack of ruggedness in the stern of the submersible, which has the potential to disable propulsion. The Navy attributed poor maintenance and faulty fabrication in the factory are responsible for the failures. These and other problems and corrections indicate the ASDS design requires review. ASDS requires further test and evaluation to verify correction of the deficiencies associated with the battery, electrical system grounds, noise signature, stern area problems, and other identified deficiencies.

AGM-88E Advanced Anti-Radiation Guided Missile (AARGM) Program

SUMMARY

- The Advanced Anti-Radiation Guided Missile (AARGM) is a major upgrade to the current High-speed Anti-Radiation Missile. The upgrade will enhance the weapon's effectiveness and minimize collateral damage and the potential for fratricide.
- Technologies inserted during this upgrade are the product of an Advanced Technology Demonstration in 1990 and an Advanced Concept Technology Demonstration in 2000.
- The Navy signed a System Development and Demonstration contract with Alliant Techsystems Missile Systems Company in June 2003.



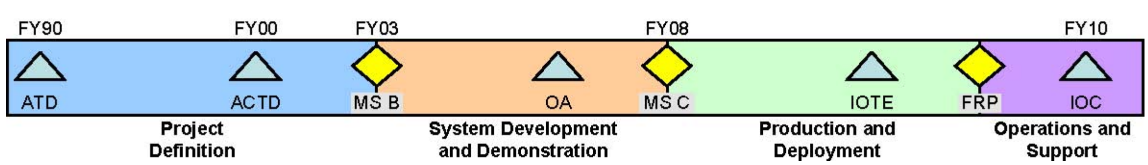
Technologies inserted during this upgrade are the product of an Advanced Technology Demonstration in 1990 and an Advanced Concept Technology Demonstration in 2000.

SYSTEM DESCRIPTION AND MISSION

The Navy intends to field AARGM as a major system upgrade to the AGM-88 High-Speed Anti-Radiation Missile. AARGM will provide the capability to engage mobile and/or re-locatable air defense systems, even if they employ shutdown countermeasures. The weapon will allow weapon employment at sufficient standoff ranges with launch and leave autonomous operation. The AARGM will provide a new multi-mode guidance section and a modified control section mated with existing AGM-88 propulsion and warhead sections. The new guidance section will have a passive anti-radiation homing receiver and associated antennae, an Integrated Broadcast Receiver to enable the warfighter to receive targeting data from national means, and an active millimeter wave radar for terminal guidance. AARGM will have the capability to transmit terminal data via a weapons impact assessment transmitter to national assets just before AARGM impacts its target. The AARGM will operate in essentially the same logistical and operational environments in which all current High-Speed Anti-Radiation Missile variants operate. The acquisition objective is 1,750 missiles.

The AARGM technology grew out of a Phase I small business innovative research Advanced Technology Demonstration that started in 1990. This effort concluded in FY02 with five successful live missile shots. In FY00, an Advanced Concept Technology Demonstration called Quick Bolt started and saw two successful missile shots during a Military Utility Assessment in FY03.

TEST AND EVALUATION ACTIVITY



DOT&E approved the AARGM Test and Evaluation Master Plan in August 2004.

The Navy will evaluate AARGM performance during two phases of operational testing:

- OT-B, an operational assessment, will provide data to support a Milestone C low-rate initial production review.
- OT-C, a full-blown operational evaluation, will provide data and analysis necessary to support a full-rate production decision review.

TEST AND EVALUATION ASSESSMENT

The success of the Advanced Technology Demonstration and the Advanced Concept Technology Demonstration justifies a low risk assessment for technology maturity. However, integration issues, software development, and a non-optimized funding profile collectively elevate the schedule risk to moderate. This is a success oriented test program. Performance shortfalls during testing may require additional test assets to ensure an adequate test and the successful execution of mission scenarios.

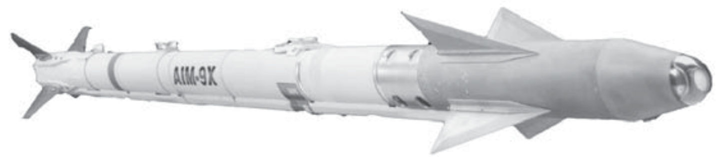
As addressed last year, the test range infrastructure is not adequate to evaluate the AARGM capabilities for target discrimination. The target set must emulate the threat systems in physical appearance, infrared and radar signatures, and electronic emissions.

We remain engaged with the Program Manager to assist in developing and procuring adequate targets for testing.

AIM-9X Air-to-Air Missile

SUMMARY

- AIM-9X demonstrated effectiveness and lethality against a representative target and threats during multi-Service operational test and evaluation (MOT&E).
- AIM-9X experienced several failures during operational testing and the Service operational testers rated it not suitable.
- AIM-9X conducted additional captive carriage missions using corrected missiles and operational units. This testing was not formal operational testing, but was adequate to show improved weapon performance (exceeding user requirements).
- After reviewing the additional captive carriage evaluation, DOT&E rated AIM-9X as operationally effective and operationally suitable.
- DOT&E approved the Milestone III Test and Evaluation Master Plan, detailing follow-on operational testing, in April 2004.



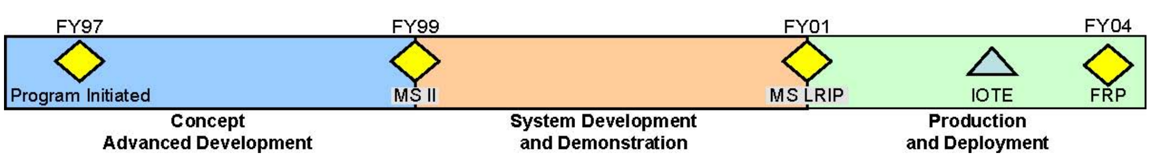
AIM-9X is a highly maneuverable, launch and leave missile that uses passive infrared guidance to engage multiple types of targets.

SYSTEM DESCRIPTION AND MISSION

The AIM-9X Air-to-Air Missile Program is the latest-generation short-range missile. It builds on capabilities of the existing AIM-9M short-range missile and is used interchangeably on Air Force and Navy/Marine Corps fighter aircraft. AIM-9X is a highly maneuverable, launch and leave missile that uses passive infrared guidance to engage multiple types of targets. It will provide day/night capability with improved countermeasures resistance and improved high off-bore sight (the angle between the launching aircraft flight path and the enemy aircraft) relative to the AIM-9M. AIM-9X works with any onboard aircraft cueing source, including the Joint Helmet-Mounted Cueing System, a parallel development program that enhances high off-boresight capability.

The AIM-9X missile retains the warhead, fuze, and rocket motor of the AIM-9M missile. A new imaging infrared seeker, a thrust-vectored tail-control actuation system, and a state-of-the-art signal processor/auto pilot provide the missile with significant performance improvements. The F-15C/D and F/A-18C/D will be the initial platforms for AIM-9X operational capability. The Services intend to integrate AIM-9X on the F-16, F/A-18E/F, F-15E, and F-22.

TEST AND EVALUATION ACTIVITY



The Air Force and Navy completed 22 missions during operational testing - seven missions used live warheads. The missions attacked a representative drone target in a variety of air combat scenarios. The scenarios verified missile performance and validated a model prediction for the scenario. The modeling and simulation validated and verified missile performance across the entire employment envelope.

Testers conducted weapon load demonstrations for each live launch mission. These demonstrations identified concerns with the F/A-18 carriage equipment and time between failures for carried missiles (both addressed during low-rate

production). Operational loaders can load AIM-9X within user requirement times.

AIM-9X was not suitable after MOT&E. To prove capability of the AIM-9X, the Navy conducted an additional captive carry program, using improved missiles carried on operational training missions. This testing included the evaluation of newer production-representative missiles and carriage equipment to see if time between failures increased. This effort completed more than 2,300 hours and showed a marked increase in time between failures compared to MOT&E.

TEST AND EVALUATION ASSESSMENT

AIM-9X is highly effective against the primary threat aircraft. It is capable of achieving kills at much higher off-bore sight angles than currently fielded missiles. It also provides increased range and target acquisition over current missiles. AIM-9X provided increased capability against countermeasures, but not as much as intended.

Operational testers rated AIM-9X as not suitable due to short times between failures. After evaluating additional captive carry missions using improved missiles, DOT&E rated AIM-9X as suitable in the beyond low-rate initial production report.

AIM-9X reduces support equipment from the AIM-9M since seeker servicing is no longer required. Since the AIM-9X is a digital system, updates and improvements can be made much more easily.

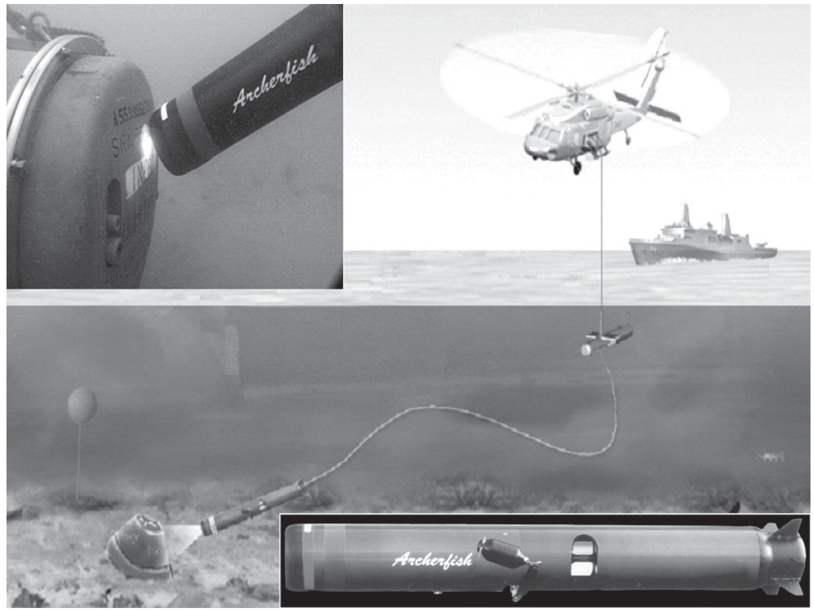
AIM-9X is lethal against the primary threat aircraft. The use of an imaging seeker (vice the contrast seeker in legacy missiles) could improve AIM-9X lethality compared to legacy missiles.

AIM-9X continues the development of seeker software to improve countermeasures capability. The program conducted captive flights and one development shot in June to assess these improvements. Test results discovered problems that are important enough to delay FOT&E (originally planned for 1QFY05) until development is complete. The developer will address the problems found during testing and merge the corrections into the next version of the software. FOT&E will likely take place in FY07. There is little operational impact to the delay since the fielded software is capable of meeting the user’s requirements.

Airborne Mine Neutralization System (AMNS)

SUMMARY

- A Quick Reaction Assessment (QRA) of the MH-53E Airborne Mine Neutralization System (AMNS) recommended the system for limited contingency deployment after the correction of training and documentation deficiencies.
- The MH-53E AMNS program concluded with the delivery of seven systems and 70 neutralizers.
- The Critical Design Review of MH-60S AMNS is complete.



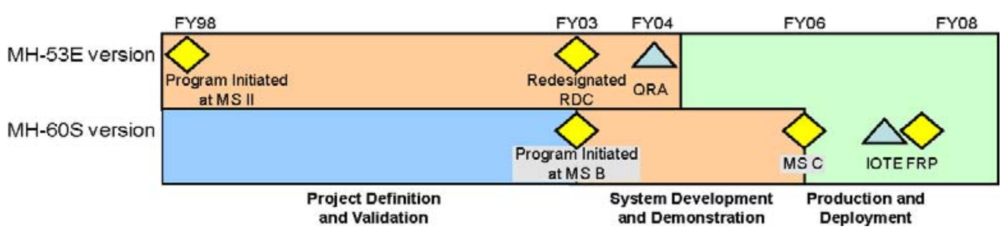
The AMNS is a helicopter-deployed mine countermeasure system that provides rapid neutralization of mines at sea.

SYSTEM DESCRIPTION AND MISSION

The AMNS is a helicopter-deployed mine countermeasure system that provides rapid neutralization of mines at sea. The Navy is acquiring two separate and distinct AMNS systems: one for the MH-53E helicopter and one for the MH-60S helicopter. Different contractors are developing the two systems. AMNS provides an organic mine countermeasure capability for aircraft carriers, large amphibious ships, and the Littoral Combat Ship. The system must be able to relocate, identify, and neutralize mines directly from the helicopter.

The location of a suspected mine (obtained from other sources) is entered into the system prior to take-off or while en route to the area of operations. Upon arrival, the aircraft hovers at a safe distance from the target position, and lowers an expendable, self-propelled neutralizer into the water. The neutralizer is either operator driven or travels autonomously to the reported target position and searches for the mine. A fiber optic cable relays information between the operator in the helicopter and the neutralizer. Once the operator relocates the target and identifies it as a mine, he positions the expendable neutralizer to detonate its shaped charge into the mine. The neutralizer disables the mine by rupturing its case or causing detonation of the mine charge. Each system comes with a reusable training neutralizer. An aircraft can carry up to four neutralizers. The MH-53E system is a modified version of a system built for German Navy mine countermeasures ships. It uses the Seafox neutralizer. The MH-60S system will use the British Archerfish neutralizer.

TEST AND EVALUATION ACTIVITY



- DOT&E representatives participated in the development of the Test and Evaluation Master Plan for the MH-60S system.
- The program office and contractor held the MH-60S system Critical Design Review in Q3FY04.

- The Navy's Operational Test and Evaluation Force conducted the MH-53E system's QRA in April 2004. The incorporated hardware changes of the tested system intended to address component obsolescence, water-tightness, and some of the performance issues noted during developmental testing.

TEST AND EVALUATION ASSESSMENT

The AMNS has an approved Operational Requirements Document, but the document is out of date and needs revision prior to the start of MH-60S system operational testing. We approved the MH-60S system's Test and Evaluation Master Plan in February 2004.

The MH-53E system had trouble meeting some performance requirements during early testing, so the program sponsor reduced the minimum performance requirements in an Operational Requirements Document clarification letter on January 27, 2003. The changes were due to a compelling fleet need to field the system and the cost/benefit of further system improvements. The Assistant Secretary of the Navy (Research, Development, and Acquisition) (ASN(RDA)) designated the MH-53E system a Rapid Deployment Capability in April 2003. This terminated the Acquisition Category II program and bypassed the planned operational testing outlined in the approved Test and Evaluation Master Plan and Operational Requirements Document. ASN(RDA) approved the production of seven MH-53E systems and 70 neutralizers and directed the conduct of an abbreviated operational test known as a QRA to evaluate the system. The QRA took the place of a full operational evaluation. The Navy plans no additional MH-53E system procurements, so this is our final report on that system.

The MH-53E system was lethal against threat mines comparable to the U.S. Mark 6 and Mark 56 moored mines when detonated in the correct firing position. However, it did not achieve required performance thresholds for probability of neutralization, neutralizer reliability, and high-current operations during developmental testing. During the QRA, the system met lowered requirements for probability of neutralization and neutralizer reliability, but did not meet the requirement for neutralizer availability. The QRA didn't evaluate high current operation and didn't demonstrate satisfactory operation at the threshold depth. Based on the QRA results, the Navy Operational Test Agency recommended the MH-53E system for limited contingency deployment after correction of training and documentation issues. The MH-53E system wasn't adequately tested and we expect it to have suitability issues if deployed.

The MH-60S system is still in development and hasn't had any operational or dedicated live fire testing. Initial contractor and developmental testing will occur in FY05. Future testing will provide data to evaluate the capability of the MH-60S design and evaluate the likelihood of correct neutralizer placement and detonation.

Amphibious Assault Ship Replacement (LHA(R))

SUMMARY

- Five of the Navy's large-deck amphibious ships (the *Tarawa*-class LHAs) will reach the end of their extended service lives beginning in 2011.
  - The first replacement ship, LHD 8, will differ significantly from preceding LHDs (LHD 1 through LHD 7).
  - The second replacement ship, LHA(R) Flight 0, will incorporate many of the design changes introduced in LHD 8, but will differ in other important respects. The design and requirements for the next replacement ships, LHA(R) Flight 1s, are currently unknown.
- A Test and Evaluation Master Plan (TEMP) to support an FY06 Milestone B for LHA(R) Flight 0 is in development. The Operational Test and Evaluation (OT&E) concept will focus on the significant changes between LHD 7 and LHD 8, and between LHD 8 and LHA(R) Flight 0. The scope of follow-on operational test and evaluation (FOT&E) for the Flight 1 ships will depend on the nature and extent of the differences between Flight 0 and the Flight 1 ships.

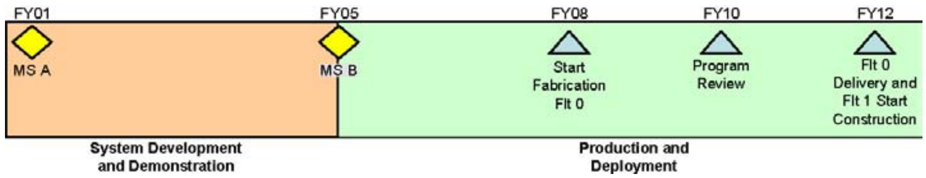
LHA(R) is the replacement class for the large-deck amphibious Tarawa-class LHAs.

SYSTEM DESCRIPTION AND MISSION

LHA(R) is the replacement class for the large-deck amphibious *Tarawa*-class LHAs. The large-deck amphibious ship fleet includes the five *Tarawa*-class LHAs and the seven ships of its successor class, the *Wasp*-class LHDs. Beginning in 2011, the five LHAs will reach the end of their 35-year extended service lives. The Navy is building LHD 8 to replace one of the LHAs; ships from a new class, LHA(R), will replace the remaining LHAs. Although labeled as the last LHD 1-class ship, LHD 8 has important differences from the preceding ships in the propulsion, power distribution, and combat systems.

LHA(R)s include one Flight 0 ship, followed by Flight 1 ships. The LHA(R) Flight 0 ship will not have a well-deck and will be incapable of supporting assault craft operations. It will provide more aviation capability than LHD 8, including increased aircraft capacity, more aviation fuel, and larger hangar and maintenance spaces. Relative to LHD 8, LHA(R) Flight 0's cargo capacity is 28 percent larger, but vehicle carrying capacity is 45 percent less. Ship service life allowance and survivability are moderately better. It should be similar to LHD 8 in most other respects, such as hull, mechanical, and electrical systems, the propulsion system, and the combat system. LHA(R) Flight 1 requirements and design are unknown.

TEST AND EVALUATION ACTIVITY



The TEMP required at the Flight 0 Milestone B will define an OT&E concept that starts with LHD 8 and addresses both LHA(R) Flight 0 and Flight 1. DOT&E met with representatives from the LHD 8/LHA(R) program office and Navy staffs to identify OT&E issues as well as the requisite OT&E phases.

Live Fire Test and Evaluation included vulnerability tests using asymmetric attacks on a decommissioned ship. Also included were fire fighting and damage control tests on Navy's fire safety research and test facility ship. The next test series of three vulnerability shots use a second decommissioned ship in FY05. Data from these tests will improve modeling fidelity of weapons effects propagation, especially in ships with large span decks like the LHA(R). Other surrogate testing planned in early FY05 at the Aberdeen, Maryland, Live Fire Test Facility will evaluate vulnerabilities from carried weapons and evaluate the bottom structure of the LHA(R).

TEST AND EVALUATION ASSESSMENT

Due to design similarities, LHD 8 test and evaluation results will apply to the LHA(R) Flight 0 evaluation; therefore, the Flight 0 OT&E program needs LHD 8's test and evaluation data to reduce the scope and expense of its OT&E. LHD 8 test and evaluation should be the first phase of Flight 0 test and evaluation. Adequate OT&E is required, but DOT&E will work with the Navy to identify ways to reduce unplanned cost and schedule impacts. For example, LHD 8 OT&E should leverage off of programmed ship tests/trials and training events as well as SSDS Mark 2 (Mod 3) OT&E. Similarly, the Navy has agreed to combine the LHD 8 survivability testing and evaluation into the LHA(R) program. Since the LHA(R) design does not contain a well deck, for example, much of the fire fighting and damage control test data already conducted for the LHA(R) will now apply to the LHD 8.

For the Flight 0 ship, the OT&E concept emphasizes early operational assessments and the information that they provide. This process, modeled on similar assessments conducted for the LPD 17-class amphibious ship program, will use Preliminary/Contract Design plans to identify operational deficiencies before construction begins. The Navy and Marine Corps operational test agencies will conduct the early operational assessments with the assistance of subject matter experts from various Fleet units and other Navy and Marine Corps Commands.

The scope of OT&E for Flight 1 ships will depend on any changes in ship mission, design, and requirements. Consequently, the program manager, with assistance of the test and evaluation integrated process team, will update the TEMP prior to the LHA(R) Flight 1 Milestone B.

AN/AAR-47 (V)2 Missile and Laser Warning System

SUMMARY

- AAR-47 is in full-rate production and fielded on many different aircraft types in both the Navy and Air Force.
- It has demonstrated effectiveness in numerous situations, but both Services are seeking multiple improvements to reduce performance problems.

The AAR-47(V)2 upgrade is designed to improve missile warning performance and reduce false alarms.

SYSTEM DESCRIPTION AND MISSION

The original AN/AAR-47, first fielded in the late 1980s, provides passive warning of infrared guided missiles directed at its host aircraft. In addition to providing warning to the aircrew, it cues an onboard expendables dispenser to eject countermeasure flares to defeat infrared guided missiles. Approximately 2,750 were produced before production ended. The system consists of four ultra-violet (UV) single-pixel quadrant sensors oriented about the aircraft to provide 360-degree azimuth protection; a processor that analyzes the signals received by the sensors declares an incoming threat, warns the aircrew, and initiates dispensing of flares; and a control/indicator unit that provides warning indications to the aircrew and allows control of the system.

The AAR-47(V)2 upgrade has improved UV single-pixel quadrant sensors that eliminated sensor blackening (a known failure mode), increased temperature tolerance, provided a more uniform sensitivity, and added a new spectral filter to improve missile warning performance and reduce false alarms.

Additionally, the new sensor has laser detectors that allow the AAR-47(V)2 to provide the functionality of the AVR-2/2A laser warning system in detecting and declaring laser rangefinders, designators, and beam-rider missiles. This added functionality allows the Navy to retire approximately 300 AVR-2/2A laser warning systems at a considerable cost savings, and provide laser warning for aircraft that did not have the AVR-2/2A installed.

Operational testing of the AAR-47(V)2 on helicopters was completed in FY03, and the system is currently in full-rate production. Approximately 1,500 AAR-47(V)2 systems have been ordered, of which 600 have been delivered. The rest are scheduled for delivery through 2007 and more orders are anticipated. Navy aircraft that have the AAR-47(V)2 include the AH-1W, UH-1N, H-1 upgrades (UH-1Y and AH-1Z), CH-46E, CH-53E, H60 family, MV-22 , P-3C, and KC-130. Air Force aircraft that have the AAR-47(V)2 include the C-130, C-141, C-5, H-60, and H-53.

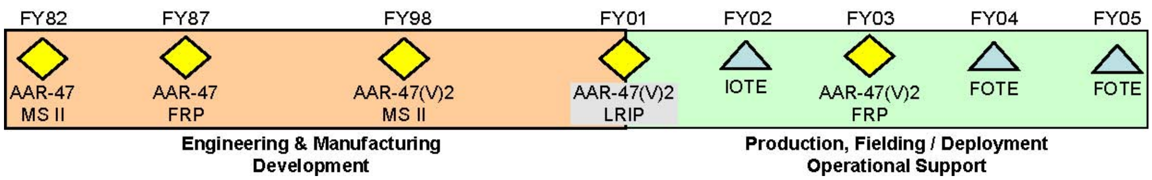
During developmental/operational testing, the AAR-47(V)2 demonstrated satisfactory performance of the missile warning function, but only partially satisfactory performance of the laser warning function. The missile and laser warning false alarm rates were acceptably low. The decision was made to go to production even though the performance against one class of laser threat was not equivalent to the AVR-2A.

After operational testing was completed, the Air Force identified several problems on the C-130 and other transport aircraft including short-term missile warning sensitivity; degradation due to some types of counter measure flares; field-of-view limitations on one type of aircraft; and algorithm shortfalls for some missile types, atmospheric conditions, and clutter backgrounds. The Air Force initiated a program to address these shortfalls, including installing "smart cables" to

eliminate sensor degradation from counter measure flares, changing sensor orientation on one aircraft type, and developing a new software algorithm.

The Navy identified short term missile warning sensitivity degradation resulting from some types of counter measure flares. The Navy is pursuing an alternate approach, (V)2 Plus, for reducing this degradation. The Navy also identified an integration problem on the P-3 involving an onboard high-power radar inducing false laser warning alerts. Similar concerns have been raised as to whether the laser onboard the MH-60R might also potentially induce false laser warning alerts. The Navy is developing a new version of the program software to address a number of other minor problems identified during integration testing on Navy and Air Force platforms. The new software is scheduled for release in the late 2004.

TEST AND EVALUATION ACTIVITY



Although operational testing was completed in FY03, a number of additional tests were conducted during FY04 and more are planned for FY05.

Navy FY04 AAR-47(V)2 tests included integration testing on the P-3 at Patuxent River Naval Air Station (NAS), integration testing of the Integrated Self Defense Suite on the MH-60R at Patuxent River NAS, and KC-130J follow-on test and evaluation (OT-IIIC(1)) at China Lake. Additional Navy FY04 tests were the Air Force “smart cables” tests on the KC-130F/R/T and KC-130J at Patuxent River NAS, and prototype testing of the (V)2 Plus on the KC-130 at Patuxent River NAS.

Air Force FY04 AAR-47(V)2 testing included C-17 prototype “smart cable” flight testing at Edwards Air Force Base (AFB), C-141 prototype “smart cable” flight testing at Wright-Patterson AFB, and Marine KC-130J and UK C-130J prototype “smart cable” flight testing Patuxent River NAS. Additional FY04 Air Force testing included C-130 and C-17 Large Aircraft Infrared Countermeasures piggy-back flight testing (multiple locations) and live fire testing of AAR-47(V)0 and (V)2 at Tonapah during enhanced Laser Infrared Fly-out Experiment Test.

Navy FY05 AAR-47(V)2 testing will include continued P-3 integration testing at Patuxent River NAS, continued MH-60R testing at Patuxent River NAS, and continued prototype testing of (V)2 Plus at Patuxent River NAS.

Air Force FY05 AAR-47(V)2 testing will include operational flight testing of “smart cable” on the C-130J and C-17; operational ground testing of “smart cable” on C-130EH, C-141, and C-5; and live missile firing test of new algorithm at Aerial Cable Range (initially AAR-47(V)0 only). Additionally, the Air Force plans to conduct sensor orientation testing on C-130EH and Testing of a prototype (V)2 Plus on the C-17 at Eglin or Edwards AFB.

TEST AND EVALUATION ASSESSMENT

AAR-47(V)2 operational testing was completed in FY03 and the system is in full-rate production. The system is relatively inexpensive, available, and has successfully protected aircraft in theater. However, questions have been raised regarding system performance and false alarm rate. Additional testing is required to better evaluate upgrades and quantify performance. The Navy and Air Force need to continue to coordinate testing and their efforts to improve system performance.

Common Submarine Radio Room (CSRR)

SUMMARY

- The Common Submarine Radio Room (CSRR) installation on USS *Seawolf* is in progress and will be complete in FY05. The Navy's estimate for the operational evaluation is late 2005.
- The Navy is revising the Test and Evaluation Master Plan to update the test schedule and to clarify test requirements. The Test and Evaluation Master Plan revision will be complete in late 2004.

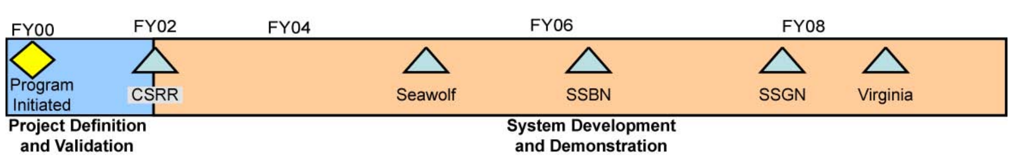
The CSRR is an umbrella program, which integrates 15 smaller acquisition programs and commercial off-the-shelf components into a system that supports network centric warfare.

SYSTEM DESCRIPTION AND MISSION

The CSRR is an umbrella program, which integrates 15 smaller acquisition programs and commercial off-the-shelf components into a system that supports network centric warfare. The Navy's goal is to provide a communications system that is common across all submarine classes, is interoperable with the planned Department of Defense Command, Control, Communications, Computers and Intelligence infrastructure, and will support the Navy's Copernicus Information System Architecture, the Joint Technical Architecture, the Global Command and Control System Maritime, and the Joint Maritime Communications System. CSRR will support the steady infusion of new technology and the modernization and replacement of obsolete equipment to allow prompt, sustained, and synchronized operations with joint U.S. and multinational forces.

The Navy will field CSRR variants upgrading the communications systems of all *Los Angeles* class, *Seawolf* class, *Trident* class, SSGN class, and *Virginia* class submarines. In order to arrive at the goal of a CSRR on all ships, the *Los Angeles* and *Seawolf* classes are being provided with a backfit Submarine Communications Support System that eliminates many legacy components in favor of CSRR components. The *Virginia* class CSRR is developed and integrated as part of new construction using the construction shipyard as the integrator. The goal for the out-years is that all in-service submarines will be upgraded to the technology of the *Virginia* CSRR, plus any necessary technology insertions, maintaining a common state-of-the-art radio room on all submarine classes.

TEST AND EVALUATION ACTIVITY



The test concept involves operational testing for each CSRR variant and end-to-end system testing for each major phase. Each CSRR variant undergoes operational testing before introducing it into the fleet. CSRR class variants may undergo a land-based operational assessment and land-based technical evaluation to mitigate risk for submarine installation. Subsequent to onboard installation, each CSRR class variant will undergo an at-sea technical evaluation (for those tests not completed in the land-based radio room) and an operational evaluation. The *Virginia* class land-based testing occurs in the Combat Control System Module Off-hull Assembly and Test site during *Virginia* class submarine

construction at the Electric Boat Company in Groton, Connecticut. At-sea operational testing of the *Virginia* CSRR will occur concurrently with the overall operational evaluation in 2008.

The at-sea operational testing of the Submarine Communications Support System-Phase I was cancelled when the test ship was deployed on short notice to Operation Iraqi Freedom. With the pending CSRR testing and no test platform, Phase 1 testing was overcome by events. The Navy will test the first version of CSRR on the USS *Seawolf* in FY05. The initial USS *Virginia* at-sea testing during builder's trials completed without communications problems. The CSRR Capstone Test and Evaluation Master Plan is undergoing a revision to clarify requirement measurements and schedules. Among other issues, the revision clarified the rules for defining failures. This Test and Evaluation Master Plan update will be complete in late 2004.

TEST AND EVALUATION ASSESSMENT

CSRR is a high-risk program because it is integrating several high-risk programs (such as the Digital Modular Radio and Multi-functional Cryptographic System into a single integrated system). Many of the sub-component programs are delivering less than fully capable systems, requiring the CSRR program to rely on legacy radio equipment to fulfill a portion of the system functionality. These delays result in either a loss of redundancy, a loss of a capability, or the loss of space because legacy systems must be retained onboard until the new capability is delivered. Due to delays in delivering full Multi-functional Cryptographic System and Digital Modular Radio functionality, the USS *Seawolf* installation, currently in progress, will result in the ship having only one UHF asymmetric data circuit. If the Multi-functional Cryptographic System and Digital Modular Radio meet their new delivery deadlines, the communications suite will be fully capable by September 2005. These delays will delay full operational testing of the *Seawolf* variant of CSRR, but will have minimal effect on planned operations on the USS *Seawolf*.

Cooperative Engagement Capability (CEC)

SUMMARY

- The shipboard Cooperative Engagement Capability (CEC) system is in full-rate production. Interoperability issues with shipboard combat systems and tactical data links continue to prevent operators from realizing the full benefit of CEC's capability.
- The airborne CEC system is in low-rate initial production. Results from FY04 operational testing and evaluation are under review.
- Work is underway to upgrade combat systems to realize full benefits of CEC composite tracking.

The CEC is a system of hardware and software that allows ships and E-2C aircraft to share radar data on air targets.

SYSTEM DESCRIPTION AND MISSION

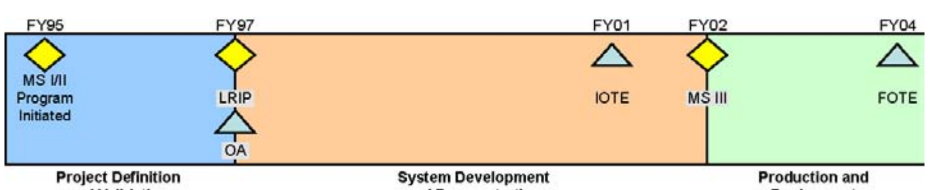
The CEC is a system of hardware and software that allows ships and E-2C aircraft to share radar data on air targets. CEC-equipped ships and aircraft transmit radar data to other CEC units via a line-of-sight radio system. Each ship or airplane uses identical data processing techniques so each will display the same track picture of aircraft and missiles. An Aegis ship can fire a missile at a hostile aircraft or anti-ship cruise missile based on radar data it receives from another CEC unit. Ships with the Ship Self Defense System or Advanced Combat Direction System can receive radar cueing information from CEC ships or aircraft to alert them to hostile air contacts. E-2C aircraft with CEC provide airborne radar coverage and extended relay capability, and receive increased track accuracy for targets held by shipboard radars.

In 1990, the Navy demonstrated a CEC prototype at sea. Navy testers conducted early operational assessments in FY94, FY95, and FY97. CEC entered engineering and manufacturing development at Milestone II in 1995. In accordance with congressional guidance, the Navy certified initial operational capability for CEC in late 1996. It was designated an Acquisition Category ID program in 1999.

Navy testers conducted Initial Operational Test and Evaluation of the shipboard system (Baseline 2.0 software) in 3QFY01. DOT&E published a beyond low-rate initial production report in February 2002. The acquisition decision memorandum of April 3, 2002, approved the shipboard system for full-rate production and the aircraft system for low-rate initial production. The Navy anticipates a full-rate production decision for the airborne system in FY05.

Eventually the Navy plans to upgrade CEC software and hardware to operate in an open architecture environment. If successful, this should correct the integration deficiencies observed in operational testing and reduce the cost of future software upgrades.

TEST AND EVALUATION ACTIVITY



The Navy conducted follow-on operational test and evaluation (OT-IIIB) in two phases from January to March 2004. This was the Initial Operational Test and Evaluation-equivalent test for the aircraft version of CEC. The test included a four-week period during a USS *John F. Kennedy* carrier strike group pre-deployment exercise and involved live missile firings at unmanned targets. Participants included *John F. Kennedy* (CV 67) and its embarked air wing (including four CEC-equipped E-2C Hawkeye aircraft) and two CEC-equipped Aegis ships.

The Navy is installing CEC in aircraft carriers and amphibious ships (LPD 17 class) that are equipped with the Ship Self-Defense System Mark 2. The program office plans operational testing for these installations in FY05 and FY06.

TEST AND EVALUATION ASSESSMENT

CEC Shipboard System with Baseline 2 Software. DOT&E's 2002 beyond low-rate initial production report for CEC determined the shipboard system operationally effective and operationally suitable. However, there were problems related to CEC's integration and interoperability with the ship's combat system and the Link 11 and Link 16 tactical data links. Although CEC produced generally excellent tracking data, the integration of the tactical data links degraded the picture operators saw on their display screens. The system also had some maintainability problems. Operational testing in FY04 (OT-IIIB) showed progress in correcting some of these problems, but the data link interoperability issue continued to prevent operators from realizing the full benefit of CEC. Correction of problems due to legacy system design is prohibitively expensive so the Navy has started a substantial effort to improve the engineering of the overall combat system. Developing an open architecture computing environment for the system may solve many of these problems. A further effort to achieve combat system interoperability may come from the model driven architecture efforts at the Joint Single Integrated Air Picture System Engineering Office. This effort will probably not be fielded before 2010.

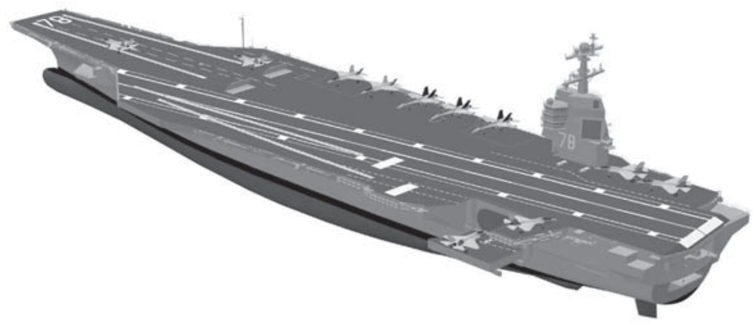
CEC Airborne System and Baseline 2 Software. We have received the Navy testers' data and evaluation of AN/USG-3 airborne CEC system performance in the E-2C. Our evaluation is ongoing, but preliminary indications are that the operational effectiveness of the system is comparable to that in surface ships. Some deficiencies exist in operational suitability. Scheduling difficulties associated with the need to run this test in an active fleet Carrier Strike Group without affecting the Navy's deployment schedule contributed to these deficiencies. Logistic and training issues associated with an initial introduction of the new system are under review for their significance to the readiness of USG-3 full-rate production.

OT&E of Network Centric Warfare Systems. The Navy has applied substantial effort to develop the Distributed Engineering Plant, an interconnection of land-based combat system components simulating shipboard and airborne systems. It has been a useful tool for new system development and for software certification. Future improvements in the Distributed Engineering Plant will provide significant, useful data for the overall test process. However, the Distributed Engineering Plant cannot take the place of realistic operational testing. Actual testing at sea with ships and airplanes is still required to adequately evaluate the effectiveness and suitability of these systems.

CVN 21 Program Next Generation Aircraft Carrier

SUMMARY

- DOT&E approved both the Live Fire Test and Evaluation Management Plan and Test and Evaluation Master Plan this year to support the Milestone B decision.
- An Early Operational Assessment (EOA) report made 51 specific recommendations to the Navy's design process for CVN21.



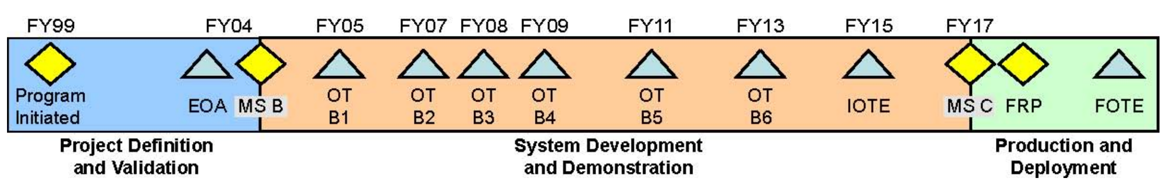
The CVN 21 program (lead ship will be CVN 78) is the planned successor for the NIMITZ-class carriers (CVN 68).

SYSTEM DESCRIPTION AND MISSION

The CVN 21 program (lead ship will be CVN 78) is the planned successor for the NIMITZ-class carriers (CVN 68). It is a single step development program maintaining the same hull form as the NIMITZ-class, but introduces several advanced technologies to increase sortie generation rate, survivability, and interoperability and to decrease manpower requirements. The Navy is designing the ship in two phases. Phase I covers the hull, mechanical, flight deck, island and radars. Phase II includes the integrated warfare system (expected to leverage extensively from DDX), and the aviation intermediate maintenance facilities. The Navy is purposefully delaying decisions on, and insertion of, Phase II equipment to provide the most advanced technology and minimize disruptive changes during ship construction.

The ship will incorporate a new nuclear propulsion plant designed to reduce reactor department manning by 50 percent and to have significantly more electric generating capacity than the present NIMITZ class plant. Hull materials and internal design features emphasize enhanced survivability. CVN 21 will have a smaller island set further back on the flight deck, featuring slightly modified DDX Dual Band Radar. The ship will have three (rather than four) aircraft elevators, two (rather than three) hangar bays, and electromagnetic (rather than steam) catapults arranged in an unobstructed configuration. It will have a redesigned advanced arresting gear and redesigned weapons stowage, as well as weapons elevators. These improvements/rearrangements, plus a slightly larger flight deck and a pit-stop (single location) fueling/arming setup, are projected to achieve a significant increase in sortie generation rate.

TEST AND EVALUATION ACTIVITY



The Navy's Operational Test and Evaluation Force conducted an EOA, OT-A, from October 30, 2003, to February 29, 2004, in support of an April 2004 Milestone B. Subject matter experts drawn from staffs, ships, Navy and joint test organizations, as well as DOT&E, reviewed ten focus areas. The subject matter experts reviewed preliminary designs, technology readiness assessments, diagrams, models, simulations, 2D visualizations, and the Electromagnetic Aircraft Launch System pre-down select demonstration units. The Navy completed their report March 19, 2004. To provide insight into future operations, the Navy plans to conduct several OT-B assessments during ship construction.

The Navy conducted six tests this year on the ex-USS *Shadwell* fire safety research and test facility. One test series replicated simulated aircraft fires in the hangar bay caused by threat weapon attack. In another test series, the Navy evaluated the current aircraft carrier magazine sprinkler system performance against in-space and adjacent space fires. The current detection system was inadequate for detecting fires prior to the build-up of potentially hazardous conditions. In addition to the above tests, the Navy conducted a scaled underwater explosion-type test this year at the Aberdeen Test Center, Maryland, to provide data to verify computer models used in vulnerability assessments and design efforts.

DOT&E approved both the LFT&E Management Plan and the Test and Evaluation Master Plan in March 2004 to support the Milestone B decision. The Under Secretary of Defense, Acquisition, Technology, and Logistics sent the LFT&E waiver for full-up system level testing to Congress in April.

TEST AND EVALUATION ASSESSMENT

The approved LFT&E program will be a comprehensive evaluation based on CVN survivability studies, lessons learned from battle damage and flight deck accidents, relevant weapon effects tests, probability of kill versus probability of hit studies, damage scenario-based engineering analyses of specific hits, vulnerability assessment reports, a total ship survivability trial, a ship shock trial, and extensive surrogate testing.

The EOA resolved no Critical Operational Issues due to system immaturity. The EOA study team assessed the design as unable to meet two Key Performance Parameters:

- Weight service life allowance.
- Sortie generation rate, to include intelligence support capability.

These two issues prompted the scheduling of a special interest Defense Acquisition Board Program Review no later than 2QFY05. The ship design team intends to resolve the weight service life allowance Key Performance Parameter during the ship design process. The sortie generation rate threshold requirements are 160 sorties per day sustained (30 days of normal operations) and 270 sorties per day surge (four days of continuous operations). The sortie generation rate model, as run during the EOA, yielded a sustained sortie generation rate of 155 per day and a surge sortie generation rate of 237. The Navy intends to re-address the assumptions and operational concepts underpinning the sortie generation rate model in preparation for the next operational assessment.

The EOA report made 51 specific recommendations to the design process. The CVN 21 program office and the contractor's design team are reviewing those recommendations for incorporation. Several recommendations deal with subsystems being developed by Participating Acquisition Resource Managers and are not under the direct purview of the CVN 21 program office and do not consider CVN 21 as a threshold platform. DOT&E believes that reducing program risk in these Participating Acquisition Resource Manager areas is critical for success and concurs with the increased focus on this issue by the CVN 21 program office during the next two years of ship design.

Two specific EOA recommendations, while not specific Operational Requirements Document requirements, are examples of the range of design considerations put forth in the EOA and under consideration by the Navy. The current design does not place forced ventilation in crew sanitary spaces. While not explicitly required in the Operational Requirements Document, the Navy shipboard habitability standard states the requirement and the EOA recommends its incorporation. The other recommendation draws attention to maintenance requirements for the MV-22. This aircraft requires more vertical clearance in the hanger deck than provided for in the current design. Although the MV-22 is not currently forecast as a member of the Navy's carrier air wing, it is a potential replacement for the current Carrier Onboard Delivery aircraft, is carrier capable, and will be in the Marine Corps inventory. The EOA recommends designing in vertical clearance in the hangar bay for the MV-22.

DDG-51 Destroyer Including AN/SPY-1D Radar and AN/SQQ-89 Integrated Surface Ship Anti-Submarine Warfare Combat System

SUMMARY

- DDG 51 Flight I, II, and IIA are operationally effective in the open ocean, blue water environment – their designed operating environment.
- Flight I and II are operationally suitable. Navy operational testers found Flight IIA degraded in maintainability, compatibility, interoperability, and safety.
- DDG 51 is less effective and at greater risk in littoral areas, where it may encounter asymmetric threats.
- DDG 51 has not had an effective mine detection capability. However, DDGs 91-96 will receive the Remote Minehunting System (RMS). RMS formal operational test will occur in FY05.

The DDG 51 Destroyer uses the AEGIS Weapon System and can conduct simultaneous offensive and defensive operations.

SYSTEM DESCRIPTION AND MISSION

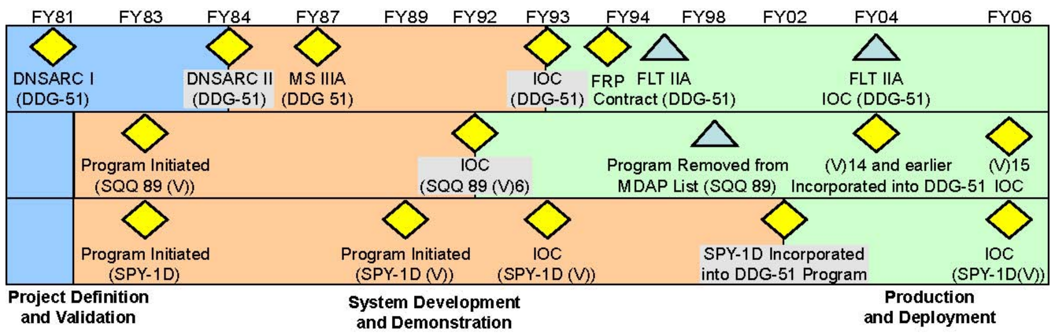
The DDG 51 Destroyer program provides replacement ships for earlier classes of surface combatants at the end of their service life. It is a multi-mission warship designed to conduct simultaneous offensive and defensive warfare operations in a variety of environments. It can operate independently or in support of carrier or expeditionary strike groups, surface action groups, intelligence gathering or Joint/Allied force operations. The Navy is building the destroyers in increments, called flights, in order to incorporate technological advancements and other changes during construction. Prior year reports described Flight I (DDG 51-71) and Flight II (DDG 72-78) configurations. Flight IIA ships (DDG 79-112) are currently undergoing operational test and evaluation as part of the DDG-51 follow-on test program. Periodic updates to AEGIS software improve system performance. DDGs have one of three software baselines: Baseline 5 (DDG 51-78), Baseline 6 (DDG 79-90), or Baseline 7 (DDG 91-112). All Baseline 5 ships will eventually receive Baseline 5.3.8. A major effort to replace outdated military computing systems with modern commercial hardware and software began with AEGIS Baseline 6 Phase I. Baseline 6 Phase III (DDG 85-90) introduces Cooperative Engagement Capability (CEC) and the Evolved Seasparrow Missile (ESSM). Baseline 7 will complete the planned commercialization of the AEGIS Weapon System (AWS) computing plant.

The AWS, which includes the SPY-1D radar and Standard Missile (SM)-2 surface-to-air missiles, provides the ship's air defense capability. ESSM (and/or the Phalanx close-in weapon system when fitted), SM-2 missiles, countermeasures, and the 5-inch gun provide defense against aircraft and anti-ship missiles. The SPY-1D radar system is a multi-function, phased array, three-dimensional (range, altitude, and azimuth) radar that conducts search, automatic detection, and tracking of air and surface targets. AN/SPY-1D (V), a new variant under development for installation in Baseline 7 Phase I ships, is intended to improve performance against targets in clutter and provide an enhanced capability against electronic attack.

For undersea warfare (USW), DDG 51 uses the AN/SQQ-89 USW combat system, up to two embarked Light Airborne Multi-Purpose System (LAMPS) Mark III helicopters, torpedoes, and vertically launched USW standoff weapons. Surface warfare weapons include the 5-inch gun and the helicopters armed with Hellfire missiles. Tomahawk missiles and the 5-inch gun engage land-based targets. Links 4A, 11, and 16 provide connectivity to other Navy, Joint, and Coalition forces.

The AN/SQQ-89(V) series of USW combat systems links acoustic sensors and weapon control systems with advanced data processing and information displays. The AN/SQQ-89(V) 6 is the baseline system for ships with a towed array. The different DDG Flights have various versions of this system installed. Other combatants also use this system. It integrates the AN/SQS-53 series hull mounted sonar, the AN/SQR-19(V) towed array sonar, and the AN/SQQ-28(V) LAMPS Mark III shipboard electronics with the Mark 116 USW Control System. In Flight IIA ships, the USW suite does not include the towed array sonar.

TEST AND EVALUATION ACTIVITY



DOT&E participated in test and evaluation working groups involved in planning Operational Tests (OT)-IIIG and OT-IIIH. OT-IIIG will test Baseline 6 Phase III ships equipped with SPY-1D radars and the SQQ89 (V)14 undersea warfare system. The test began in mid FY04 and will continue into FY05. OT-IIIH will test Baseline 7 Phase I ships with the SPY-1D (V) radar and the SQQ89 (V)15 system. The test will occur in FY05. DOT&E also participated in Test and Evaluation Master Plan revisions for DDG 51and AN/SPY-1D (V).

Navy testers conducted an operational assessment of the SPY-1D (V) radar in February 2004 at the Navy's Combat System Engineering Development Site in Moorestown, New Jersey. They also conducted a Maintenance Demonstration in May 2004 on USS *Mason* (DDG 87), as part of OT-IIIG. DOT&E staff observed the test activities.

Navy testers conducted an interoperability test on USS *Mason* during a Joint Exercise with the USS *John F. Kennedy* Strike Group. The test was a developmental test, but was observed by the Navy's Operational Test Force. Evaluation of test data is in progress and will be included in the OT-IIIG report.

TEST AND EVALUATION ASSESSMENT

Computer software problems with the AWS Baseline 6 Phase 3 program delayed the OT-IIIG test. As reported, portions of the test are complete and the final phase, a war at sea scenario, is scheduled for November 2004. Results will be in next years report.

The SPY-1D(V) assessment of the February 2004 test indicated that software reliability and maintainability were below threshold and, along with interoperability, are areas of significant risk for this program.

As reported last year, DDG 51 is operationally effective in an open ocean, blue-water environment – its designed operating environment. However, it is less effective and at greater risk in littoral areas, where it may encounter asymmetric threats. Flight I and II ships are operationally suitable, but maintainability, compatibility, interoperability, and safety deficiencies degrade the operational suitability of Flight IIA variants. The anti-submarine warfare testing at the Atlantic Undersea Test and Evaluation Center (AUTEC) highlighted the problems created by the recent closing of the Atlantic Fleet Weapons Training Facility. The restricted size, unusual bathymetry, and limited shipping traffic make AUTEC an unrealistic site for operational testing. As the Navy continues to emphasize shallow water operations, the lack of an appropriate littoral test site will become a serious limitation.

DD(X) Land Attack Destroyer

SUMMARY

- Navy testers completed an early operational assessment of the preliminary DD(X) design in Q1FY05 to support Milestone B.
- Developmental testing of the Multi-Function Radar engineering development model began in Q1FY05 at Wallops Island, Virginia.
- Developmental testing of the Long-Range Land Attack Projectile began in Q1FY05 at San Nicolas Island, California.
- Autonomic Fire Suppression System feasibility demonstrated in testing aboard Ex-*Peterson.*
- Live Fire Test & Evaluation (LFT&E) of the Peripheral Vertical Launch System successfully demonstrated a new missile storage concept.
- Navy's proposal for testing DD(X) self-defense against anti-ship cruise missiles is not adequate.

DD(X) will be a multi-mission destroyer featuring a composite deckhouse and a Wave-Piercing Tumblehome Hull displacing about 14,000 tons.

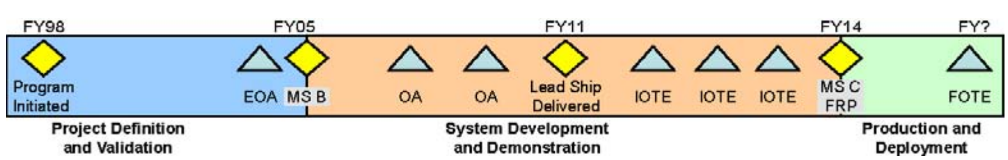
SYSTEM DESCRIPTION AND MISSION

DD(X) is the replacement for *Spruance* (DD 963) class destroyers and *Oliver Hazard Perry* (FFG 7) class frigates, which are reaching the end of useful service life. DD(X) will be a multi-mission destroyer with a composite deckhouse. It will have integrated sensor and communications apertures and a Wave-Piercing Tumblehome Hull. Displacement will be about 14,000 tons. Optimized for the land-attack mission, it will have two Advanced Gun Systems and a combined magazine capacity of 600 rounds of long-range land attack munitions. A convertible storeroom will carry 320 additional rounds when required. Each Advanced Gun System will consist of a single-barrel 155mm gun supplied from an automated magazine. An Advanced Vertical Launch System with 80 cells will carry Tomahawk Land Attack Missiles, Standard Missiles (SM2-MR) for local air defense, Evolved Seasparrow Missiles for air and surface threats, and Vertical Launch Anti-Submarine Rockets to combat submarine threats. Two 57mm Close-In Gun Systems will protect against close-in air and surface threats. Operational requirements include full-spectrum signature reduction so the ship can operate in all threat environments.

DD(X)'s integrated power system will share electrical power between propulsion motors and other electrical loads such as combat systems and auxiliary services. The Navy expects the new Dual Band Radar suite and the Integrated Undersea Warfare System to provide state-of-the-art battle space surveillance. Advances in survivability and shipboard computing systems should reduce crew size, with further reductions possible by incorporating new technology during follow-on ship development.

On April 29, 2002, the Navy announced it selected Northrop Grumman Ship Systems as the DD(X) design agent. Raytheon is the system integrator. The program office will seek approval to proceed with lead ship construction at Milestone B in March 2005.

TEST AND EVALUATION ACTIVITY



- DOT&E participated in DD(X) requirements and design reviews including design reviews for the twelve Engineering Development Models of ship systems with the greatest technical risk. Among them are Advanced Gun System, Long Range Land Attack Projectile, Advanced Vertical Launch System, Integrated Deck House and Apertures, Total Ship Computing Environment, and the Integrated Propulsion System. Additionally, DOT&E has been active in the development of the draft DD(X) Test and Evaluation Master Plan and LFT&E Management Plan.
- Design Agent test activity included a series of Engineering Tests and higher-level developmental tests designed to mitigate risk.
- DOT&E participated in an early operational assessment conducted by the Navy's Operational Test and Evaluation Force. Teams of subject matter experts from the fleet and Navy shore activities examined the ship's design and the analyses, modeling, and simulation used by the developers to assess design risk, identify capability gaps, and recommend potential design enhancements.
- LFT&E activity was extensive in FY04. The program tested the newly developed automatic fire suppression system aboard ex-*Peterson* using a surrogate threat weapon at sea. During the test, the automatic fire suppression system reconfigured itself using sensors and Smart Valve technology. The shipboard fires were controlled and eventually extinguished. In a second test, testers allowed a severe fire to burn for several minutes before activating the automatic fire suppression system. The system was able to contain the fire without a manned response. Additionally, the program office tested a new approach to storing missiles in a full-scale replica of the peripheral vertical launch system. The challenging detonation scenario involved exploding a threat warhead where it would create a mass detonation of the stowed ordnance in the launcher. Although demonstration of the concept was successful, some redesign of the peripheral vertical launch system structure is required.

TEST AND EVALUATION ASSESSMENT

The Joint Requirements Oversight Council approved the DD(X) Operational Requirements Document in FY04. We expect to approve the Test and Evaluation Master Plan in FY05 if the Navy proposes an acceptable approach for end-to-end mission testing of DD(X) close-in self defense against anti-ship cruise missiles (ASCM). That approach has to include end-to-end testing with DD(X) combat system elements on the Self Defense Test Ship. The proposal to date is for unacceptable segmented vice end-to-end operational testing. Further, their proposal for assessing the probability of ASCM raid annihilation departs in significant ways from the approach being followed by LPD 17 and envisioned for future ship classes. This raises questions of whether it is executable, minimizes the opportunity to reduce costs through shared test and evaluation resources, and departs from use of a consistent probability of ASCM raid annihilation assessment approach across the several ship classes.

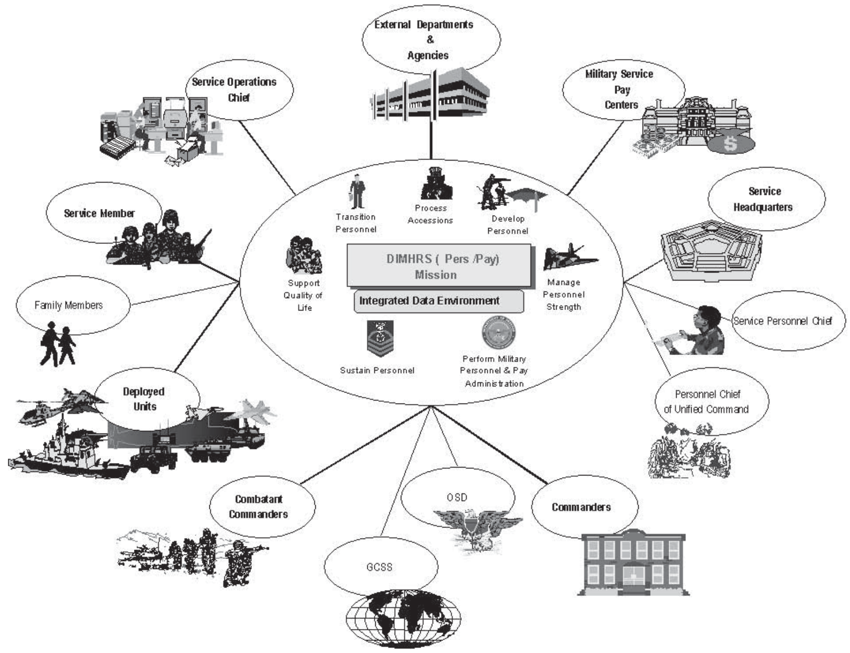
Another operational testing challenge stems from the fact that no existing Navy test facilities can accommodate end-to-end testing of the Advanced Gun System and Long Range Land Attack Projectile against realistic targets.

DD(X) has a robust LFT&E program that will provide a comprehensive survivability evaluation of the advanced technologies used in this new generation destroyer. DOT&E will work with the program office to complete the LFT&E Management Plan and waiver in FY05.

Defense Integrated Military Human Resources System (DIMHRS)

SUMMARY

- Defense Integrated Military Human Resources System (DIMHRS) integrates all personnel and pay functions for uniformed personnel into a single system.
- Northrop Grumman was selected in 2003 as the system developer and implementer.
- DIMHRS will use PeopleSoft™ as the system core.
- Testing of DIMHRS presents a major challenge to DoD, and each Service will test DIMHRS, beginning with the Army.



DIMHRS will provide a fully integrated military personnel and pay system for all components of the military Services.

SYSTEM DESCRIPTION AND MISSION

The objective of DIMHRS is the automation and integration of personnel and pay entitlement business processes into a standard single point of entry system. DIMHRS will provide a fully-integrated military personnel and pay system for all components of the military Services. It will replace 17 legacy systems including all currently operating Service-specific pay and personnel systems. The Program Office is developing DIMHRS upon commercial off-the-shelf applications. The program will conduct an extensive reengineering of business practices that capture the best of both private and public sectors.

The initial core system of DIMHRS will provide support to processes that are common to all Services. This core system shall collect, store, pass, process, and report personnel and pay data for all DoD Active Duty, Reserve, Guard, and retired personnel. DIMHRS will support the needs of the individual military Service departments and, in time of war, the Coast Guard. Common software and databases are the foundation of DIMHRS.

The Services will retain their management functions to ensure personnel operational readiness. Personnel and pay organizations will use DIMHRS at all echelons of command to support personnel and pay functions. Managers and analysts in the Office of the Secretary of Defense, the Joint Staff, and other federal agencies will use DIMHRS for planning and reporting purposes.

DIMHRS will address current personnel and pay entitlement support deficiencies. The Joint Requirements Oversight Council-approved Mission Needs Statement identified the following five requirements that DIMHRS must address:

- Provide Combatant Commanders with accurate and timely personnel data needed to assess operational capability.
- Employ standard data definitions across Services.
- Correctly track mobilized reservists.
- Provide accurate personnel tracking into and within a theater of action.
- Simplify data entry, system maintenance, and resolution of pay discrepancies.

The Navy Reserve Information Systems Office initially managed DIMHRS, but a Joint Program Management Office operating under the Navy Space and Naval Warfare Command was set up in early 1999 to manage DIMHRS. The initial acquisition strategy developed by the Program Management Office (PMO) was flawed, and the Joint Requirements and Integration Office under the Office of the Under Secretary of Defense for Personnel and Readiness suspended the strategy and released an improved strategy during FY01. The PMO released an Acquisition Strategy Plan in March 2002. The PMO awarded Northrop Grumman the contract as system developer and integrator in September 2003.

As of August 9, 2004, the program was in breach of schedule and cost parameters established in its Acquisition Program Baseline. DOT&E approved a DIMHRS Test and Evaluation Master Plan (TEMP) on March 17, 2003. Subsequently, the Program Office submitted a revised draft TEMP in January 2004, but DOT&E has not approved it, due to the pending acquisition strategy changes.

TEST AND EVALUATION ACTIVITY

The PMO has held several test and evaluation integrated product team meetings over the past four years. Other than these meetings, there have been no actual test events for DIMHRS to date. Based on the currently projected schedule, the initial operational test and evaluation of the first increment will occur during the first quarter of FY06.

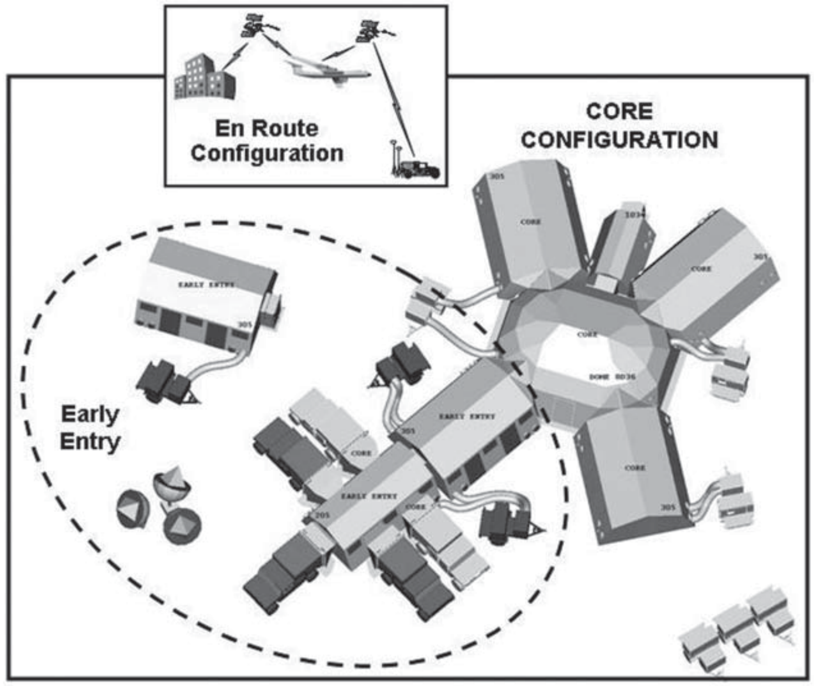
TEST AND EVALUATION ASSESSMENT

The operational test agency for each of the Services plans to evaluate DIMHRS in their own respective Service environment, coordinated by the lead operational test agency, the Navy Operational Test and Evaluation Force. The Army will be the first Service to receive DIMHRS for operational testing purposes, and plans to execute the first phase of operational testing at Schofield Barracks, Hawaii. The coordination of the Service-specific efforts has been the focus of several integrated product team meetings, and the planning is becoming more mature.

Deployable Joint Command and Control (DJC2) System

SUMMARY

- The Deployable Joint Command and Control (DJC2) program office successfully deployed the prototype DJC2 to support U.S. Southern Command exercises. The exercises provided early, operationally relevant insights to support selection of components.
- In the operational test conducted in June 2004, operators successfully used the DJC2 system to execute the Effects Based Planning and Operational Net Assessment methods of the Standing Joint Force Headquarters (SJFHQ).
- While the parts of DJC2 that were included in the test show DJC2 successfully supports SJFHQ planning methods, the test did not exercise all the DJC2 capabilities that were outlined in the Test and Evaluation Master Plan (TEMP) for this event.
- As a result, the program office is seeking another operational event in early FY05 to reduce performance risk prior to the multi-Service Initial Operational Test and Evaluation (IOT&E).
- In addition, DOT&E estimates the schedule is high risk due to the time available to execute the required integration, acceptance testing, and government test events prior to the multi-Service IOT&E in 3QFY05.



DJC2 provides the Joint Force Commander with a deployable integrated family of systems to plan, control, coordinate, execute, and assess operations.

SYSTEM DESCRIPTION AND MISSION

The DJC2 system provides the Joint Force Commander with a deployable integrated family of systems to plan, control, coordinate, execute, and assess operations across the spectrum of military operations. The DJC2 infrastructure and information technology systems support:

- Collaborative planning.
- Predictive battlespace situational awareness.
- Dynamic asset synchronization and oversight.
- Executive battle management and control.

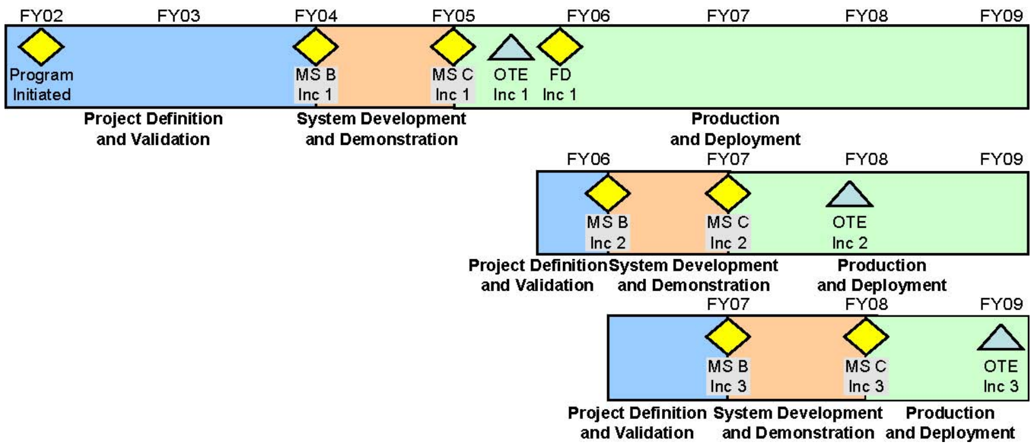
DJC2 Increment I uses existing command and control systems including the Global Command and Control System-Joint and the Collaborative Information Environment. Future increments will use the Joint Command and Control system to provide for both garrison and deployed operations. The DJC2 consists of shelters, hardware, software applications, databases, and communication support systems. The DJC2 system has three basic configurations:

- The En-route package fits on a C-130 or C-17 aircraft and has hardware to support 10 to 20 operators.
- The Early Entry package consists of sufficient infrastructure (e.g., tents, tables), computers, and communications equipment to support 20 to 40 operators.
- The Core package expands on the Early Entry package with additional infrastructure and other elements to support up to 60 operators.

To provide needed agility, each Regional Combatant Commander receives multiple Core packages to combine into larger command headquarters.

The program follows an evolutionary acquisition strategy. DJC2 Increment I completed Milestone B in March 2004. Milestone C occurs in December 2004. A Milestone B for Increment II follows in 3QFY06. The government is the system integrator for the first increment and transitions this task to industry for future increments.

TEST AND EVALUATION ACTIVITY



The U.S. Southern Command used a DJC2 prototype in two training exercises (December 2003 and January 2004). The prototype included equipment from several manufacturers in order to compare components and finalize the DJC2 design. The prototype provided the infrastructure parts (e.g., tents, generators, tables, etc.) planned for the eventual design. However, the information technology capability was limited to two networks, 13 servers, and collaboration and operational net assessment software tools. The Joint Communications Support Element provided the communications support, including tri-band satellite, Global Broadcast System, phone lines, and video teleconferencing.

The DJC2 system completed Developmental Test BII and Operational Test BI in June 2004 at the DJC2 Engineering and Test Facility. The DJC2 demonstrated information technology (servers, networks, and laptops), portal software, collaborative information environment tools, and a beta version of the Global Command and Control System-Joint common operational picture and intelligence functions. The test did not include deployable components (e.g., tents, generators) or tactical communications.

The Test and Evaluation Integrated Product Team continues to plan and coordinate with the United States Pacific Command (PACOM) on required test conditions and potential exercises for the multi-Service IOT&E in FY05. Due to schedule considerations, the Cobra Gold 05 training exercise in May 2005 appears to be the best match.

TEST AND EVALUATION ASSESSMENT

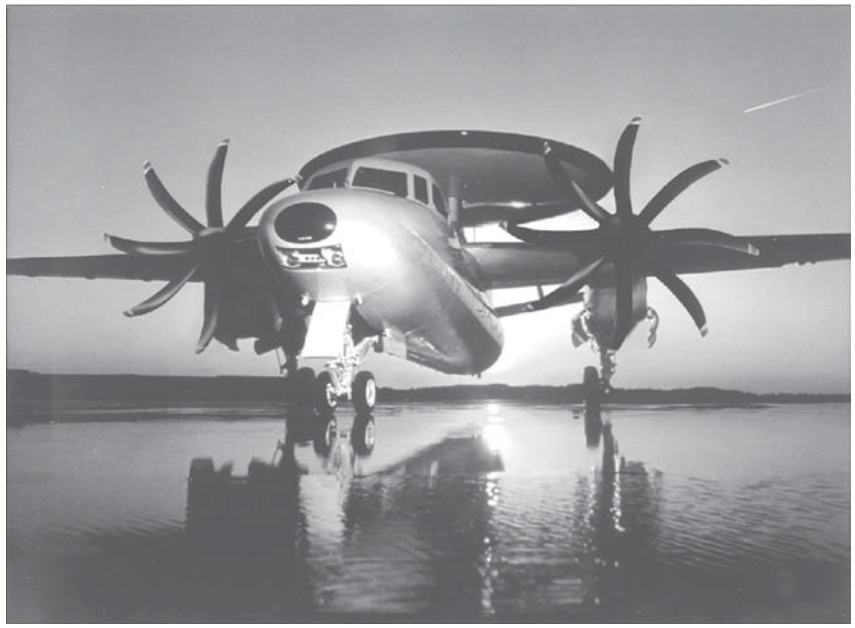
The Program Office successfully deployed the prototype DJC2 to support U.S. Southern Command exercises. The exercises provided an early opportunity to obtain operationally relevant insights to support component selection before finalizing the system design and configuration. It also offered the test community an opportunity to become familiar with the DJC2 design and operational concepts. The experience helped system engineering efforts, development of operational concepts, and planning for future test events.

In Operational Test BI, the operators did mission planning using the Effects Based Planning and Operational Net Assessment methods of the SJFHQ. While the parts of DJC2 that were included in the test show DJC2 successfully supports SJFHQ planning concepts, the test did not exercise all the DJC2 capabilities outlined in the TEMP for this event. As a result, the Combined Test Force and the program office are planning another event to reduce performance risk prior to the multi-Service IOT&E.

DOT&E considers the program's ability to deliver a mature system to PACOM in February 2005 to support Cobra Gold 05 in May high risk due to the limited time available to:

- Finalize the design.
- Complete integration activities.
- Plan and execute an additional operational test.
- Conduct developmental testing.

E-2C Advanced Hawkeye (AHE)



The AHE includes a Radar Modernization Program and a number of other modifications.

SUMMARY

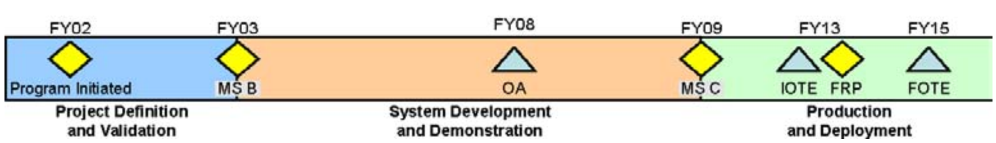
- The Advanced Hawkeye (AHE) includes a major radar replacement that should significantly improve E-2C's littoral and surveillance capabilities.
- The Navy completed technology demonstration testing of the radar on a C-130.
- An important aspect of operational test and evaluation will be verifying that the AHE is interoperable with joint forces and supports the 2010 Test and Evaluation Master Plan architecture that the Joint Theater Air and Missile Defense Office is developing.

SYSTEM DESCRIPTION AND MISSION

There are currently two E-2C configurations in the Hawkeye procurement program: the Hawkeye 2000 and the Advanced Hawkeye (AHE). The Hawkeye 2000 is an umbrella term for multiple improvements to the Group II E-2C, each of which is a separate program. AHE includes a Radar Modernization Program (RMP) and a number of other modifications.

The AHE program completed Program Design Review in April 2004. This program will replace the E-2C's radar with an ultra-high frequency (UHF) Electronically Scanned Array radar via the RMP. This radar will provide significantly increased detection performance over the current radar, particularly in over-land and littoral operations. The other AHE modifications include an upgraded Identification, Friend or Foe system, a modernized tactical cockpit, a new intercom system, upgraded electrical generators and power distribution system, an upgraded liquid cooling system, and Multi-function Information Distribution System upgrades. Additionally, AHE will incorporate mandated safety improvements including Crash Survivable Flight Incident Recorder, Terrain Approach Warning System/Ground Proximity Warning System, Collision Avoidance System, and an Integrated Material Diagnostic System. Finally, a RMP Cooperative Engagement Capability software modification is required.

TEST AND EVALUATION ACTIVITY



- AHE completed a series of test flights using the radar technology demonstration system developed for Mountain Top, a ground demonstration capability installed on a C-130.
- DOT&E approved the AHE Test and Evaluation Master Plan in June 2003.
- Due to its importance to fleet air operations, evaluation of the E-2C will be commensurate with the context of its expected combat missions.

- The Navy developed a comprehensive survivability evaluation plan to ensure the needed data and information is available.

TEST AND EVALUATION ASSESSMENT

The Naval Air Warfare Center Aircraft Division, Patuxent River, Maryland, conducted the AHE radar risk reduction flight-testing on the NC-130H aircraft from December 2002 to June 2003. Integrated into the NC-130H is the Advanced Development Model radar system, used during the demonstrations at the Pacific Makaha Ridge Facility in 1997 and 1999. Specific risk reduction objectives included adaptive computer processing operations and radar system performance. The system operated in over-land and littoral environments, which included ground traffic, clutter, jamming, and casual electromagnetic interference. Radar system assessment included controlled target detection range performance in clutter and jamming environments and system accuracy. Initial analysis of flight test data indicates the program met all system risk reduction objectives. It also achieved all predicted performance capabilities. The E-2C survivability program is adequate to evaluate the survivability of the aircraft.

A critical aspect of E-2C AHE operational testing will be joint interoperability (which was unresolved in the previous operational evaluation of E-2C modification), as well as Information Assurance. There is currently no Information Assurance plan for AHE. The Joint Theater Air and Missile Defense Office is coordinating significant analysis and design reviews for the Single Integrated Air Picture (SIAP) for theater air and missile defense architectures. This effort includes other upgraded systems, such as the Block 40/45 upgrades to the E-3 and new platforms, such as the Joint Land Attack Cruise Missile Defense Elevated Netted Sensor, as well as the AHE. Additionally, the SIAP Engineering Task Force is coordinating efforts to improve the quality of the air picture available to the Joint Forces Air Component Commander and to the forces conducting and fighting the air battle through improvements in the available data links. Joint interoperability is essential to DoD achieving its theater air and missile defense goals. AHE interoperability testing in the joint mission environment will be a critical part of operational test and evaluation.

EA-6B Upgrades

SUMMARY

- Significant system upgrades involving operational testing are the Improved Capability (ICAP) III receiver modification and the Low Band Transmitter (LBT) jamming pod.
- ICAP III initial operational test and evaluation ended in October 2004 and the results are being analyzed. Significant improvements have been made since the 2003 operational assessment (OA), but a preliminary analysis indicates additional improvements are needed.
- LBT is in an OA. Key reliability numbers and performance requirements looked good in developmental testing.

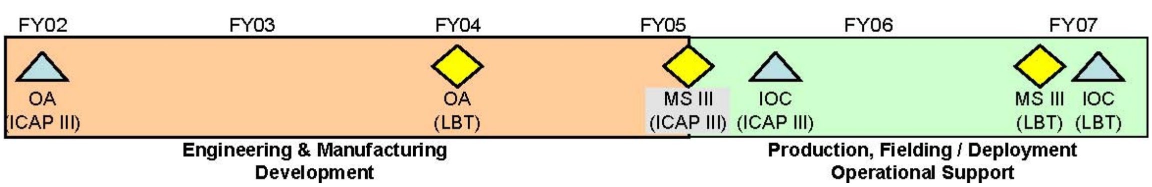
The EA-6B continues to undergo a number of upgrades culminating in the ICAP III selective reactive jamming capability with improved information displays and battle management capabilities.

SYSTEM DESCRIPTION

The EA-6B is a four-person, carrier capable, twin turbojet tactical aircraft. Its primary mission is the interception, analysis, identification, and jamming of radio frequency transmissions of enemy weapons control and communications. The crew includes one pilot and three electronic countermeasures officers. The EA-6B carries the ALQ-99 Tactical jamming System, which includes a receiver, processor, and various mission-configured jammer pods carried as external stores. The EA-6B has the USQ-113 Communications Jammer and may also be armed with the high-speed anti-radiation missile for enemy surface-to-air radar destruction and suppression. The EA-6B is a key contributor to the Suppression of Enemy Air Defenses Electronic Attack mission.

Operational since 1972, the EA-6B continues to undergo a number of upgrades culminating in the ICAP III selective reactive jamming capability. Ancillary improvements currently underway include a new LBT capability, a prototype Band 7/8 pod development, and minor USQ-113 communications jammer modifications.

TEST AND EVALUATION ACTIVITY



The Navy has been conducting ground and flight system testing on the new ICAP III receiver (AN/ALQ-218) since February 2002. A two-month OA involving 29 open-air range flight sorties completed in 2003. Operational Evaluation (OPEVAL) flights began in April 2004. OPEVAL consists of 15 Electronic Attack/Electronic Support flight sorties, participation in a large-scale joint exercise, and a two-week carrier deployment; all planned for completion by the end of 2004. A Milestone III decision is planned for 3QFY05.

The rebaselined LBT program began developmental tests in July 2004. Operational testing is being planned in two phases:

- OAs to be conducted during late 2004 and early 2006 to support a low-rate initial production of 20 ship sets.
- An OPEVAL, scheduled for January to March 2007, to support a Milestone III decision June 2007 for production of 208 ship sets.

Band 7/8 jammer pod tests were limited to in-plant design evaluations. A USQ-113 communications jammer test to verify the correction of some deficiencies was completed with satisfactory results on a limited number of corrections.

TEST AND EVALUATION ASSESSMENT

The ICAP III receiver upgrade's preliminary performance has been promising. The program's risk centers on its ability to provide accurate emitter geolocation in full azimuth coverage for high-speed anti-radiation missile targeting and the reactive jamming of selected hostile emitters. Testing indicates that the system is potentially effective and potentially suitable.

Many improvements have been made since the OA in 2003. Remaining high interest issues include built-in test, unreliable display monitors, false emitter detection rates, and the lack of a satisfactory mission planner. As with previous versions of ICAP, tactical concept development and further software refinements will continue after operational testing and initial fielding (late FY05). Recent changes to the acquisition strategy have not adversely affected test adequacy.

The LBT is being flown on the China Lake open-air range after successful developmental test flights at Naval Air Station Patuxent River, Maryland. The OA, started in September 2004, will be monitored carefully to ensure that planned reliability improvements have been achieved, and that the system's communication jamming capabilities are adequately tested. Initial reliability performance appears to be a significant improvement over existing pods.

There are testing restrictions with both LBT and USQ-113 systems in the lower frequency bands due to the impact on civilian sector usage of those frequency bands. This has limited and complicated testing in the past, and will continue to be a challenge in the future. Improvements in test capability in these lower frequencies are needed.

Evolved Seasparrow Missile (ESSM)

SUMMARY

- As a result of poor aerial target performance during the FY03 operational evaluation (OPEVAL), the Evolved Seasparrow Missile (ESSM) operational effectiveness is undetermined. ESSM is suitable and the warhead is lethal.
- Follow-on Operational Test and Evaluation (FOT&E) requires:
    - Testing with an Aegis combat system against supersonic, sea-skimming, maneuvering targets, and supersonic, high-diving targets; the existing schedule (FOT&E-1) includes only the former.
    - Testing with ESSMs that have undergone shipboard storage for the requisite duration.
    - Testing with non-Aegis combat systems as ESSM integration occurs with these systems. This will require the non-Aegis combat systems on the Self Defense Test Ship.
- Consideration should be given to providing surface target engagement capability with ESSM in Aegis systems.

The ESSM is a short-range missile intended to provide self-protection for surface ships.

SYSTEM DESCRIPTION AND MISSION

The ESSM is a short-range missile intended to provide self-protection for surface ships. ESSM development intended to balance total system effectiveness against the low-altitude supersonic anti-ship cruise missile (ASCM) threat. On Aegis ships, ESSM launches from the Mark 41 Vertical Launch System. Each launcher cell stores four missiles, with folded tail fins (Aegis destroyers have 96 cells and Aegis cruisers have 128 cells that can hold a mix of weapons such as ESSM, Standard Missile, and Tomahawk). Vertical launch requires a thrust vector control system on the ESSM rocket motor. Up-linked signals provide guidance commands until the ESSM is near the target, at which time guidance transitions to semi-active homing on reflected radar signals from the target. Another guidance mode is home-all-the-way, requiring no up-linked commands. At this time, funding for ESSM installation is for Aegis ships only. Other launch systems on non-Aegis ships (aircraft carriers, amphibious assault ships, other surface combatants) will fire ESSMs using the home-all-the-way mode. ESSM uses an 8-inch diameter modified guidance section and a new warhead section. A new 10-inch diameter rocket motor provides higher thrust for longer duration than predecessor Seasparrow missiles. ESSM is a cooperative development effort that includes 13 participating governments.

The Milestone II review was in November 1994. During 1998, the program restructured to add an operational assessment (Operational Test-IIA) based on missile flights at White Sands Missile Range, New Mexico, to support the first low-rate initial production decision. Results of operational testing (Operational Test-IIC) with the Self Defense Test Ship supported an additional low-rate initial production decision. Live Fire Test and Evaluation (LFT&E)/section level ground testing, conducted in FY96-FY98, included arena warhead tests against fragmentation mats and components of United States and foreign targets. In addition, LFT&E used results of flight testing during Operational Test-IIC, technical evaluation, and OPEVAL. The Assistant Secretary of the Navy for Research, Development, and Acquisition approved full-rate production in January 2004.

TEST AND EVALUATION ACTIVITY

DOT&E completed its combined OT&E/LFT&E report to Congress in January 2004. Results of the technical evaluation and OPEVAL conducted on USS *Shoup*, in March and April 2003, were the basis of the report. The LFT&E occurred at Dahlgren, Virginia, and Socorro, New Mexico, in 1997.

TEST AND EVALUATION ASSESSMENT

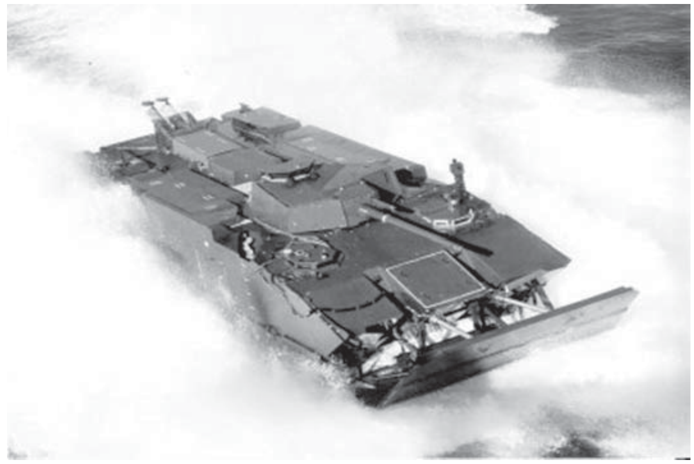
As a result of unsatisfactory aerial target performance, DOT&E concluded that OPEVAL testing was not adequate for determining ESSM operational effectiveness. In particular, ESSM did not demonstrate capability against the supersonic, maneuvering, seaskimming ASCM and supersonic, high altitude, terminal diving ASCM threat. ESSM demonstrated capability against the non-maneuvering, low-altitude, subsonic ASCM threat. DOT&E's conclusion of inadequate testing differs from the Navy's Operational Test Agency conclusion that the missile is operationally effective, although the Navy included the caveat that performance against high-G maneuvering, sea-skimming, supersonic ASCMs remained undemonstrated. ESSM is operationally suitable, and the ESSM warhead is lethal against the ASCM threat. The full-rate production decision memorandum acknowledged the necessity for FOT&E with a maneuvering supersonic sea-skimming target.

FOT&E requires flight testing against the threat ASCM categories inadequately examined during the OPEVAL. FY05 FOT&E-1 includes a scenario against one of these categories: the supersonic, maneuvering, sea-skimming ASCM. Other requirements include flight testing in the presence of electronic jamming as well as with ESSMs that have undergone fleet representative shipboard storage time. Additional required testing includes ESSM against a Threat D target. The Navy needs to acquire credible Threat D surrogates and conduct ESSM testing against them.

The OPEVAL used an Aegis Weapon System Baseline 6.3 with Mark 41 vertical launch system. Other combat systems (based on the Ship Self Defense System Mark 2 or DD(X), for example) are sufficiently different that flight testing is a requirement when ESSM/combat system integration occurs. Safe and realistic combat system testing will require the Self Defense Test Ship for end-to-end self-defense mission execution.

Although it is not a requirement, non-Aegis combat systems with predecessor Seasparrows provide a useful capability against surface threats. Limitations in the Aegis Weapon System Baseline 6.3 computer program and shipboard illuminator radars precluded testing ESSM's capability against surface targets. Consideration should be given to providing surface target engagement capability with this and follow-on Aegis baselines.

Expeditionary Fighting Vehicle (EFV)



SDD-phase EFVs have shown substantially improved performance compared to earlier prototypes, but operationally relevant questions will remain unanswered until operational test and evaluation resumes in FY05.

SUMMARY

- The Expeditionary Fighting Vehicle (EFV) design changes implemented in the System Development and Demonstration (SDD)-phase EFV's personnel variant improved troop carrying capacity and safety.
- Replacing co-rotating water jets with counter-rotating water jets both increased the vehicle's capability to achieve high water speed and improved controllability.
- Detailed planning is nearly complete for the pre-low-rate initial production decision operational assessment.

SYSTEM DESCRIPTION AND MISSION

The EFV is an amphibious armored personnel carrier that will replace the current Marine Corps amphibious assault vehicle—the AAV. Two variants are under development:

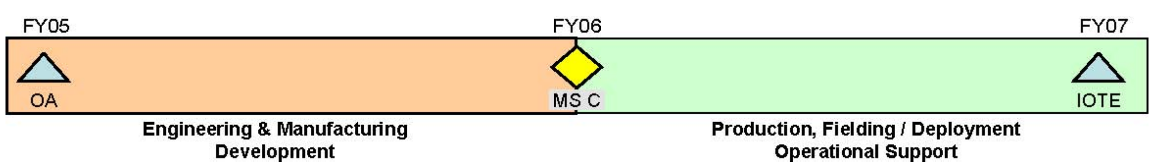
- The personnel variant (EFV(P)) will be armed with a 30mm cannon and a 7.62mm machinegun and is intended to transport 17 combat-equipped Marines and a three-man crew.
- The command and control variant (EFV(C)) will transport a commander and staff.

An operationally configured EFV will weigh about 39 tons and travel in excess of 20 knots in 3-foot wave sea conditions, and at 43 miles per hour on a level, hard-surface road.

The EFV is designed primarily to provide an over-the-horizon amphibious assault capability for Marine Air-Ground Task Force elements embarked aboard amphibious ships. Once ashore, the EFV(P) will be an armored personnel carrier, providing transportation, protection, and direct fire support. The EFV(C) will serve as a tactical command post.

The EFV entered its SDD phase in December 2000. The schedule calls for a low-rate initial production decision in 1QFY06.

TEST AND EVALUATION ACTIVITY



FY04 test and evaluation activities largely consisted of development testing and evaluation using SDD-phase EFV(P)s and an EFV(C), including land and water mobility, safety (noise, vibration, toxic fumes), firepower, and C4I system performance. There were no operational test and evaluation events in FY04, but the Marine Corps Operational Test and Evaluation Activity observed and reported on:

- An EFV(C) user jury event which used a Fleet Marine Force battalion staff to operate the vehicle during simulated scenarios.

- A developmental test and evaluation event that examined EFV compatibility with Maritime Pre-positioning Force shipping.
- A developmental test and evaluation event that examined the lethality of various candidate 30mm rounds.

The Marine Corps also performed detailed test planning for the pre-low-rate initial production operational assessment. In FY04, the Direct Reporting Program Manager restructured the low-rate initial production entrance criteria and eliminated the Ballistic Vulnerability Test. Live fire tests will now include additional testing on production-like components and full-up system level testing on SDD vehicles.

Live Fire Test and Evaluation (LFT&E) activities in FY04 included technical and validation testing of redesigned armors, component technical testing, and revisions of the LFT&E strategy in the Test and Evaluation Master Plan. Technical and validation testing of the new armors will continue into FY05.

TEST AND EVALUATION ASSESSMENT

Data from contractor developmental test and evaluation, while limited, showed that design changes implemented in the SDD-phase EFV(P)s significantly increased troop carrying capacity and reduced the amount of time it takes for Marines to egress from the vehicle. These improvements make it more likely that EFV(P) will meet the troop carrying capacity Key Performance Parameter and required egress times during the upcoming operational assessment. Land mobility test results have been similarly positive, although challenges remain in ensuring that the vehicle can operate safely on severe slopes. The Marine Corps also conducted tests to confirm the EFV's capability to negotiate obstacles such as vertical steps and trenches.

Water mobility results have been encouraging, particularly in demonstrating the benefits from replacing co-rotating water jets with counter-rotating water jets. This change both increased the vehicle's capability to achieve high water speed and improved controllability. Reliable performance in the water, particularly of the EFV's hydrodynamic appendages, has not been demonstrated.

Safety-related concerns remain—specifically, high interior noise and vibration levels. Corrective actions have been proposed, but not demonstrated in test.

The EFV(C) user jury's primary objectives were to support an initial assessment of human systems integration, the performance of the installed C4I systems, and conditions inside the vehicle. Conditions were not operationally challenging with respect to communications distances, and the results were generally positive. The participating battalion staff noted that the EFV(C) would substantially exceed the current capability. Areas requiring attention include reducing vibration, integrating own-vehicle position location information with onboard command and control applications, managing co-site interference, and providing a reliable auxiliary power unit.

A Maritime Pre-positioning Force compatibility test showed that in most respects the EFV was compatible with Maersk-, AMSEA-, and Waterman-class ships. Unlike AAVs, EFV's will require lighterage to get ashore during in-stream offloads since the EFV's greater weight precludes them from using the Maritime Pre-positioning Force ships' roll-on/roll-off stern ramps to offload and self-deploy. Also, because the EFV's footprint is roughly 25 percent larger than an AAV's, deck-space needed to embark EFV units will be correspondingly greater.

Developmental testing was conducted to provide data on the terminal ballistic performance of candidate 30mm rounds against personnel, lightly fortified infantry emplacements, light armored vehicles, trucks, and infantry fighting vehicles. These data will be used to select the 30mm rounds that will be employed and, subsequently, to support an evaluation of the contribution of the EFV's weapons to overall system effectiveness.

Overall EFV system reliability remains a significant challenge because of the system's comparative complexity and harsh operating environment. Even assuming adequate funding of reliability improvement initiatives, the risk is high that the vehicle's 70-hour mean time between operational mission failures requirement (a Key Performance Parameter) will not be met during IOT&E. The Marine Corps has asked the Joint Requirements Oversight Counsel to reduce the Key Performance Parameter threshold to 43.5 hours, but the reduction has yet to be approved.

The test program described in the revised LFT&E strategy should be adequate to support the required vulnerability evaluation of the EFV. DOT&E and the Marine Corps Operational Test and Evaluation Agency will continue to leverage developmental testing to refine the scope of full-up system level tests outlined in the LFT&E strategy.

SDD-phase EFVs have shown substantially improved performance compared to earlier prototypes, but operationally relevant questions will remain unanswered until operational test and evaluation resumes in FY05. The EFV(P) has not yet demonstrated that it can accomplish its primary mission: that is, transport combat-equipped Marines from an amphibious ship located 20 to 25 nautical miles offshore to objectives located inland without degrading the Marines' physical condition. The performance of an integrated EFV(C) also will not be demonstrated during operational test and evaluation until FY05. Finally, concerns remain about the use of the less corrosion-resistant aluminum alloy, Al2519, and the potential impact on life cycle cost.

F/A-18 E/F and EA-18G Super Hornet

SUMMARY

- The combat proven F/A-18E/F is operationally effective and suitable. It is in production and replacing the F-14 and older F/A-18s as part of an integrated and networked force.
- The EA-18G will serve as the Navy's replacement for the EA-6Bs, providing an enhanced capability to detect, identify, locate, and suppress hostile emitters.
- Both aircraft have current and approved Test and Evaluation Master Plans.

The F/A-18E/F features improvements in range, endurance, carrier bring-back, weapon payload, and survivability over earlier models of the Hornet.

SYSTEM DESCRIPTION AND MISSION

The F/A-18E/F Super Hornet is a multi-mission, day/night strike fighter aircraft that provides precision strike capabilities to Joint Task Force and Carrier Strike Group Commanders. The F/A-18E/F features improvements in range, endurance, carrier bring-back, weapon payload, and survivability over earlier models of the Hornet. It also provides in-flight refueling for other tactical aircraft and additional room for growth and upgrades. The F/A-18E is a single-seat aircraft while the F/A-18F is a two-seater. The EA-18G is a two-seat derivative of the F/A-18F and will incorporate a version of the new EA-6B Improved Capability III electronic attack suite.

All F/A-18 E/Fs in Lot 22 through Lot 25 are Block 1 aircraft. Block 2 begins with Lot 26 (FY03) and incorporates a re-designed forward fuselage and provisions to incorporate major equipment upgrades including Active Electronically Scanned Array radar, Advanced Crew Station, 8x10 display (in the F model), Fiber Channel Network Switch, and Digital Video Map Computer. Advanced Mission Computers and display upgrades the mission computers from an assembly language-based system to an open architecture, higher order language beginning with Lot 25.

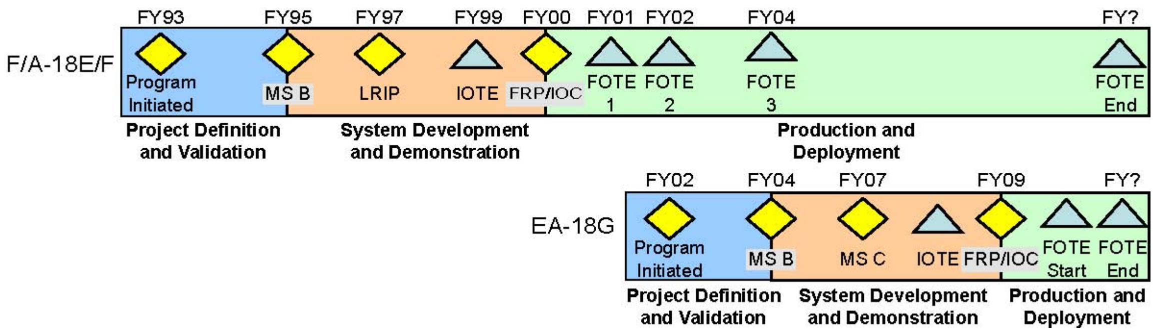
The Advanced Crew Station is a completely re-designed aft cockpit in Block 2 F model aircraft. It provides a workstation for the Weapon System Officer that will enhance aircrew coordination and situational awareness for increased combat capability in heavy threat and high cockpit task loading environments. Advanced Crew Station will allow for spiral capability upgrades, including completely de-coupled cockpits in which one crewmember can be in air-air mode and the other in air-ground mode.

The Advanced Targeting and Designation Forward-Looking Infrared System fields the latest generation of technology in infrared targeting capabilities, including laser spot tracker, air-to-air laser ranging, electronic zoom, geographic-point targeting, and Electro-optics. It combines the functions of two legacy pod systems (Targeting and Designation Forward-Looking Infrared System and laser spot tracker) into one pod. This next-generation technology provides three fields of view and allows flight operations up to 50,000 feet altitude. The Advanced Targeting and Designation Forward-Looking Infrared System fits on the left fuselage weapons station of all variants of the F/A-18.

The EA-18G is the fourth major variant of the F/A-18 aircraft. It will serve as the Navy's replacement for the aging fleet of EA-6Bs, providing an enhanced capability to detect, identify, locate, and suppress hostile emitters. The EA-18G will possess enhanced connectivity to national, theater, and strike assets and provide organic precision emitter targeting for

employment of onboard suppression weapons such as the High-speed Anti-Radiation Missile. The EA-18G will also provide self-escort capability through its inherent AIM-120 capability. The first production EA-18Gs will be Lot 30 aircraft (FY08) incorporating a functionally equivalent version of the EA-6B Improved Capability III Airborne Electronic Attack system.

TEST AND EVALUATION ACTIVITY



In April 2000, DOT&E's beyond low-rate initial production report to Congress stated that the F/A-18E/F was operationally effective and operationally suitable. Since then, the Navy's Operational Test and Evaluation Force has conducted two follow-on test and evaluation (FOT&E) periods incorporating new tactical software and hardware upgrades to the F/A-18E/F. The Navy completed the latest FOT&E in early 2004 and certified the conversion of the aircraft mission computers from assembly language to the new open architecture higher order language.
FOT&E 3 began in June 2004 and is testing the following upgrades:

- Software configuration set H-2 (the first higher order language software that will deploy in late FY04 or early FY05)
- Type II advanced mission computers
- Advanced Crew Station upgrade for Block 2 F aircraft
- AIM-9X (for the E/F)
- Additional F/A-18 roadmap improvements

Operational evaluation of the Shared Reconnaissance Pod system and follow-on operational test of the Advanced Targeting Forward Looking Infrared system Block 2 capabilities, which include electro-optic camera and laser spot tracker, were originally intended for FOT&E 3. The Navy delayed the Shared Reconnaissance Pod system due to high altitude sensor production and other outstanding system deficiencies. Additionally, the Navy convened an independent panel to assess the current Advanced Targeting Forward Looking Infrared program and weigh alternatives due to deficiencies in the performance of Block 2 subsystems.

The Defense Acquisition Executive approved Milestone B for the EA-18G in December 2003 for FY04-FY09 System Development and Demonstration. Shortly after this approval, the Navy signed two contracts with Boeing - an $8+billion multiyear production contract for an additional 210 F/A-18 aircraft and an Airborne Electronic Attack System Development and Demonstration contract for $1+billion. To date, Boeing has concentrated testing on the aeromechanical aspects of the System Development and Demonstration prototype aircraft. By January 2005, the Navy should have an updated Test and Evaluation Master Plan that addresses Airborne Electronic Attack capabilities more comprehensively.

TEST AND EVALUATION ASSESSMENT

DOT&E based its assessment on operational testing activities conducted during the past year.

The F/A-18E/F program is progressing well as the Navy integrates the Super Hornet within the vision of a networked force. The Navy schedules and conducts testing at regular intervals to incorporate warfighting upgrades. FOT&E 3 testing is progressing satisfactorily and will result in a fleet deployable mission computer software load (H-2E) for Lot 25 and newer aircraft. Planned testing, to begin in January 2005, of the next iteration of higher order language software

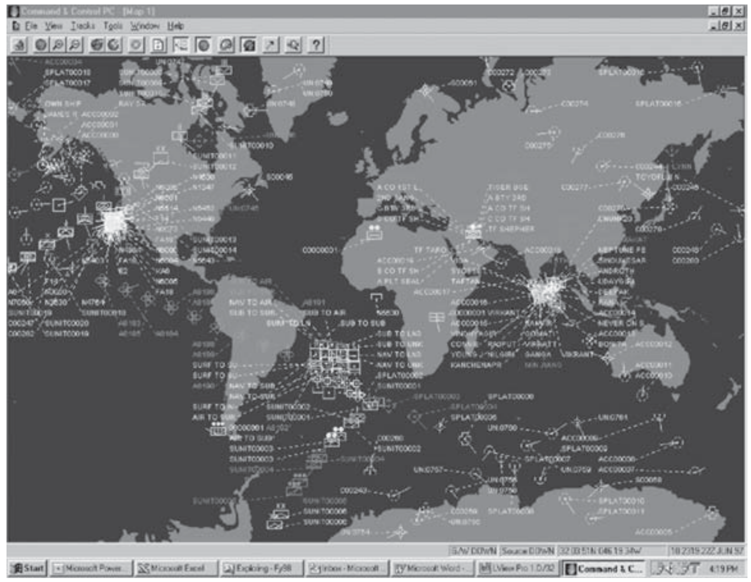
(H-2E+) will enable the F/A-18E/F to send and receive imagery via Link-16. Assessment of the next major E/F upgrade, the Active Electronically Scanned Array radar, is in the Active Electronically Scanned Array radar chapter of this report. The Navy is planning for appropriate testing to explore and characterize the following EA-18G risk areas:

- Effective operation of wing pod antenna/receiver configuration in the high vibration F/A-18F under-wing and wingtip environments.
- Modifications to, and integration of, the Improved Capability III weapon replaceable assemblies with the F/A-18F airframe.
- Installation and antenna pattern sufficiency of existing ALQ-99 jammer pods.
- Human factor/operator issues in Electronic Attack and Support operations as performed by the EA-6B.

Global Command and Control System - Maritime (GCCS-M)

SUMMARY

- There were two major developmental tests conducted on v4.0 software. DT-V was conducted in a lab environment, with emphasis on validation of functional requirements and non-environment dependent key performance parameters (KPPs).
- The Test and Evaluation Master Plan was updated for v4.0 testing.



GCCS-M provides maritime commanders at all echelons of command with a single, integrated, C4I system that processes, correlates, and displays information on friendly, hostile, land, sea, and air forces, to support command decision making.

SYSTEM DESCRIPTION AND MISSION

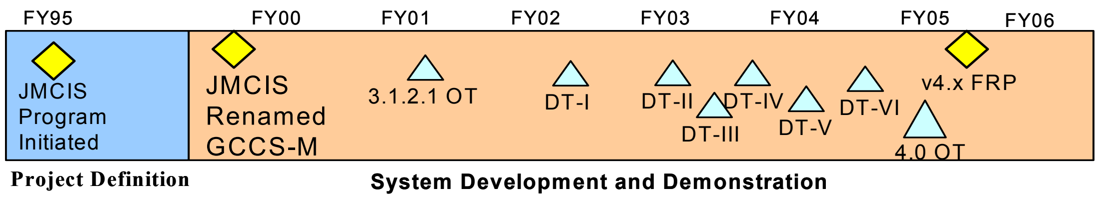
Originally initiated as the Joint Maritime Command Information System, GCCS-M is now the Maritime implementation of the U.S. Global Command and Control System (GCCS). GCCS-M provides maritime commanders at all echelons of command with a single, integrated, scalable C4I system that processes, correlates, and displays geographic track information on friendly, hostile, and neutral land, sea, and air forces, integrated with available intelligence and environmental information, to support command decision making. GCCS-M is implemented afloat, ashore at fixed command centers, and as the command and control (C2) portion of mobile command centers.

GCCS-M fields a baseline system consisting of core functionalities and a set of mission specific subsystems. Additional subsystems, as well as core upgrades and new functionality, will be fielded in future releases allowing GCCS-M to evolve as warfighter requirements change, or new ones are added. GCCS-M will migrate from HP-Unix operating system to the Solaris operating system starting with version 4.0, resulting in a reduction in total ownership costs by eliminating the need for joint applications to develop HP-compliant applications specifically for the Navy.

GCCS-M expands existing C4I baseline capabilities through the evolutionary, incremental implementation of hardware and software releases. This approach provides the user with state-of-the-art C4I capabilities that keep pace with both continually evolving operational requirements and technological advances. Central to the success of this approach is adherence to an open-system commercial and government standards-based architecture that maximizes use of non-developmental items. GCCS-M must also be in compliance with the Defense Information Infrastructure Common Operating Environment (DII COE) to ensure interoperability with U.S. Joint and other Naval C4I systems. A key goal of GCCS-M is to serve as the host for other independently-built applications using the COE. GCCS-M can be used as a building block for C4I systems that range in size from a single server, and client workstation, through a large multi-server multi-client architecture.

GCCS-M v3.1.2.1 had been declared effective and suitable in 2002 and is executing well in the fleet. Several critical interfaces have not been formally tested and certified for interoperability by the Joint Interoperability Test Command (JITC). In 2004, the program completed, and the Joint Staff approved, an interoperability KPP that will allow JITC to test all critical interfaces during the v4.0 operational test scheduled for completion in January 2005.

TEST AND EVALUATION ACTIVITY



- There were two major developmental tests conducted on v4.0 software. DT-V was conducted in a lab environment, with emphasis on validation of functional requirements and non-environment dependent KPPs.
- DT-VI, called TECHEVAL, was conducted in September 2004 at operational units afloat and selected TacMobile and ashore sites.
- under operational conditions. This purpose of this test was to determine system readiness for operational evaluation.
- The Test and Evaluation Master Plan was updated for v4.0 testing.

TEST AND EVALUATION ASSESSMENT

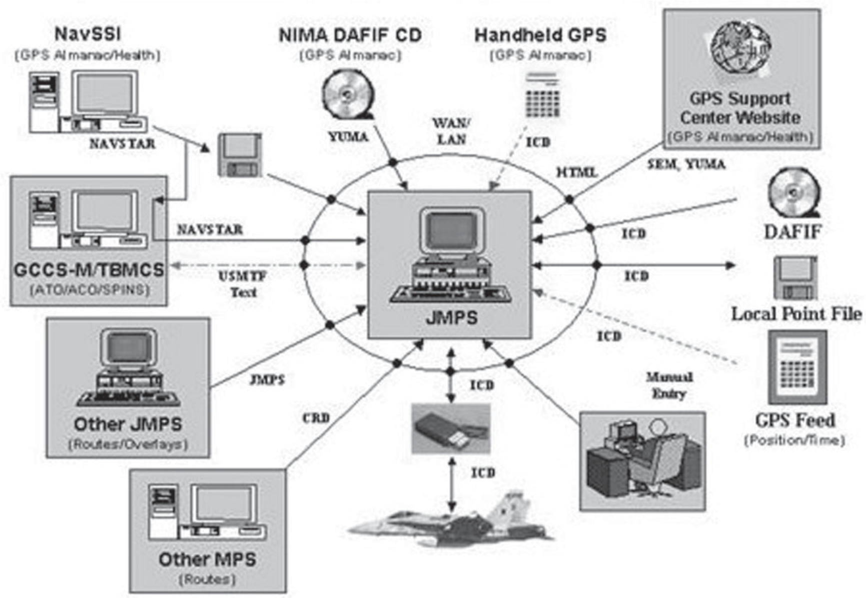
During DT-V, the system demonstrated improved maturity and performed well with few major problems. Following several fixes and regression testing, the system was assessed to be ready to proceed to the final phase of developmental testing.

The TECHEVAL was conducted on USS *Nimitz*, COMPACFLT, COMSUBPAC, Tactical Support Center Jacksonville, Florida, and the Mobile Operational Command Center Atlantic at Jacksonville. All critical technical parameters (CTPs) were met, and all KPPs that could be tested were met. Some KPPs relate to functions performed only on ships other than aircraft carriers. During this test, GCCS-M v4.0 provided the desired functionality when operated in an operationally representative environment. Areas where capability exceeded that provided by GCCS-M v3.x included CTP results, expanded track types in the common operational picture, intelligence and imagery work space, improved integration of objects on the chart, portable user profiles, and server reliability. The system was found to be more network sensitive than GCCS-M v3.x, and system administration and account management were more complex. This might be expected as systems move toward net-centricity. System maturity continued to improve, and all significant issues were closed in preparation for entry into operational evaluation starting in December 2004.

Joint Mission Planning System (JMPS)

SUMMARY

- The Navy and Air Force are developing the Joint Mission Planning System (JMPS) to provide a common mission planning and data loading system.
- Both Services will operationally test the first versions of JMPS in FY05.
- Both the Air Force and Navy have adequate Test and Evaluation Master Plans and test plans.



Aircrews using JMPS will be able to complete required mission planning and aircraft data loading for fixed and rotary wing aircraft missions.

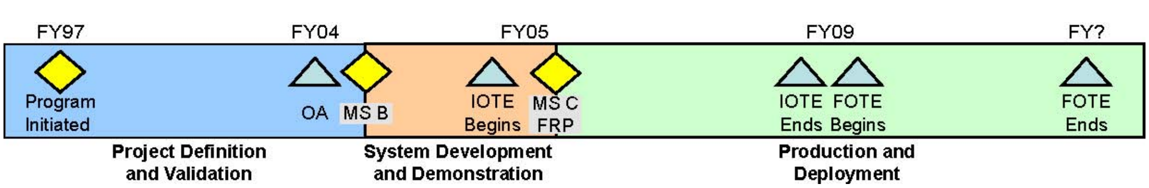
SYSTEM DESCRIPTION AND MISSION

JMPS uses commercial off-the-shelf PC hardware running a Defense Information Infrastructure Common Operating Environment-compliant version of Windows 2000. JMPS software consists of a Mission Planning Environment, which includes the basic operating framework, basic mission planning functions, and common software components. The Mission Planning Environment is coupled with a set of software modules for a given aircraft type (e.g. F-15E or F/A-18) called Unique Planning Components. JMPS system configurations are either a) non-networked stand-alone laptops or PCs, or b) secure, network-connected systems supported by servers.

The Air Force and Navy are developing JMPS as a common effort to replace both Services' mission planning systems. Northrup Grumman Information Technology (NGIT) is developing the JMPS framework for the Services. NGIT is building initial service-specific versions of JMPS on parallel paths that are supposed to converge with JMPS Version 1.3. The Navy's version is JC1 (also known as JMPS-Maritime, JMPS-M, and JMPS Version 1.1). The Air Force version is JCP (or JMPS Version 1.2).

Aircrews using JMPS will be able to complete required mission planning and aircraft data loading for fixed and rotary wing aircraft missions. JMPS will also include the ability to plan for unmanned aerial vehicles, avionics and sensors, unguided and precision guided munitions, and cruise missiles. The Marine Corps, Army, and U.S. Special Operations Command also plan to eventually transition to JMPS from their current mission planning systems. All JMPS users will eventually be able to collaborate on mission planning, even when operating from different bases.

TEST AND EVALUATION ACTIVITY



DOT&E approved the Navy and Air Force Test and Evaluation Master Plans on February 24, 2004, and July 22, 2004, respectively.

From December 11-18, 2003, Navy operational test crews performed the first Developmental Test Assist (DT Assist) on JC1 at the Naval Air Warfare Center-Weapons Division, Pt. Mugu, California, and the Integrated Battlespace Arena at China Lake, California. Test crews participated in two additional DT Assist periods in April and August 2004. The Navy will start Initial Operational Test and Evaluation (IOT&E) of JC1 in conjunction with F/A-18 testing of Operational Flight Program 19C in early FY05.

The Air Force conducted developmental testing of JCP through FY04. JCP will begin IOT&E in mid-January 2005 with the upcoming F-15E Suite 4 upgrade. IOT&E will continue with different aircraft-specific Mission Planning Environments through FY09.

TEST AND EVALUATION ASSESSMENT

The Navy DT Assist identified numerous issues of concern with JC1, including a recommendation by the Joint Interoperability Test Command (JITC) that JC1 not proceed to dedicated OT&E until the problems are resolved. JITC observed the DT Assist to determine the extent to which JC1 could receive and accurately interpret textual and geospatial data and transfer the finished mission plan via a data transfer device (DTD) to an associated aircraft or weapons system. JITC found problems with DTD loading, data displays, data transfer errors, and Global Positioning System (GPS) almanac data loading, among other functions.

The Navy's Commander, Operational Test and Evaluation Force issued a Letter of Observation after the December 2003 DT Assist, documenting concerns about system stability, interoperability, human factors, training, and maintainability; these include problems with DTD loading, GPS crypto keys, security, graphical displays, training plans, and system administrator workload.

Results from the Navy's April 2004 DT Assist demonstrated both continuing and new problems with reliability, human factors, and combat DTD creation and loading. Test crews generated deficiency reports on system crashes, menu and graphical interface organization, crypto key support, network configurations, security, and file sharing problems, among others. Although problems persist, the user community agreed that the risk for entry into OT&E is lower than for previous builds.

The Navy submitted a Test Plan to OSD in April 2004. The Air Force submitted a draft Test Plan in May 2004. Both Services' Test Plans appear adequate to determine effectiveness and suitability, if tests include in-flight data verification for critical functions affected by JMPS products (e.g., weapon delivery).

Joint Standoff Weapon (JSOW)

SUMMARY

- The AGM-154A Joint Standoff Weapon (JSOW) Baseline system now meets suitable levels of reliability, logistic supportability, and built-in test capability. System accuracy is improved by 45 percent.
- If the Baseline system configuration changes, we will require operational testing of this weapon system's full capability in the face of strong head and tail winds.
- Follow-on free-flight operational testing of the Unitary system against a realistic threat array is necessary to confirm weapon survivability modeling and simulation results.
- DOT&E is assessing the AGM-154C (Unitary variant) effectiveness and suitability for combat.

Operational evaluation of the AGM-154C demonstrated the weapon impacted the target and detonated during ten of eleven weapon release events. However, the mission planning system occasionally is unable to complete mission-planning operations.

SYSTEM DESCRIPTION AND MISSION

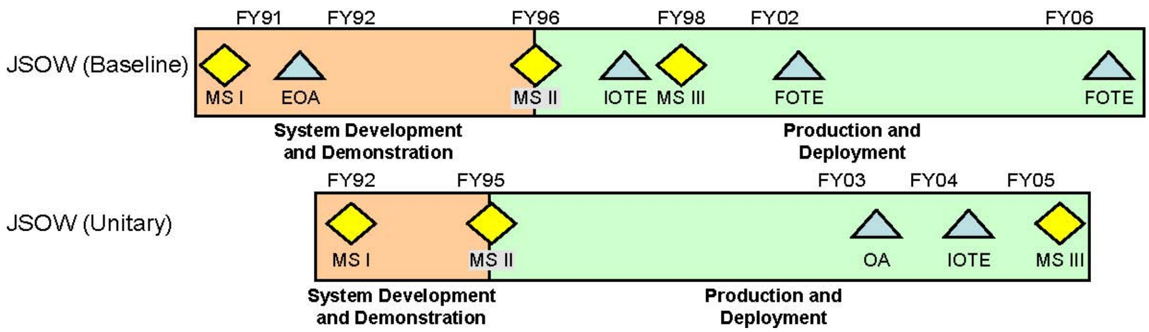
The JSOW, produced by Raytheon, is a family of kinematically efficient (~12:1 glide ratio) 1,000-pound class, air-to-surface glide weapons intended to provide low observable, standoff precision engagement and launch-and-leave capability against a wide range of targets during day/night, all weather conditions. Both JSOW variants employ a tightly coupled Global Positioning System/Inertial Navigation System. JSOW is employed for interdiction of soft/medium fixed, re-locatable, and mobile light armored targets; massed mobile armored targets; anti-personnel; and air-to-surface threats. JSOW primarily functions in a preplanned mission mode. The system will permit pilot manual inputs of up to six targets, as well as third party targeting. The weapon is planned for land- and carrier-based operations.

Currently, the Navy's Tactical Automated Mission Planning System and the Air Force Mission Support System accomplish mission planning. Mission planning with the Joint Mission Planning System (JMPS) is anticipated in the future. The following aircraft will employ JSOW: F/A-18C/D and E/F; F-16C/D; F-15E; Joint Strike Fighter; B-1B; B-2A; and B-52H. The weapon comes in two operational variants:

- AGM-154A (JSOW Baseline) – Air Force and Navy: The payload of the AGM-154A consists of 145 BLU-97/B sub-munitions. The BLU-97/B is a combined effects munition. The bomblets consist of a shaped charge for light armor defeat capability, a fragmenting case for material destruction, and a zirconium ring for incendiary effects. JSOW Baseline is designed to conduct pre-planned attacks on stationary soft targets such as air defense sites, parked aircraft, components of airfields and port facilities, command and control antennas, stationary light vehicles, trucks and artillery, and refinery components.
- AGM-154C (Unitary Variant) – Navy only: The AGM-154C, utilizing the same Global Positioning System/Inertial Navigation System as the Baseline variant, will use an autonomous imaging infrared seeker for target acquisition and terminal guidance. The AGM-154C will carry the British Aerospace multiple warhead system (Broach). The Broach warhead, consisting of an augmenting charge and a follow-through bomb, can be set to explode both warheads simultaneously or sequentially. The AGM-154C is designed to attack point targets vulnerable to blast

and fragmentation effects and point targets vulnerable to penetration, such as industrial facilities, logistical systems, and hardened facilities.

TEST AND EVALUATION ACTIVITY



AGM-154A (Baseline Variant)

Test planning for a new software update began in June 2004. Although the new software variant should not reduce wind estimation uncertainties, its software design is intended to:

- Improve weapon performance during in-flight and target area operations when released from high altitude and lower airspeeds.
- Enable achievement of the requirement for low altitude, standoff deliveries.
- Permit an alternative input to the altitude component for use during target area operations.
- Remove a GPS anti-spoofing constraint shown during operational testing to reduce the probability of timely GPS signal acquisition.
- Update weapon logic thresholds.
- Establish a common software build for both the AGM-154A and AGM-154C.
- Enable the AGM-154C to automatically accept a pre-planned fuze delay setting when mission-planning data is initially inserted in the weapon.

Adequate operational test of the fielded software variant concluded in FY03. No additional operational testing occurred in FY04.

AGM-154C (Unitary Variant)

Initial operational testing began in November 2003 and concluded in September 2004. Testing consisted of captive-carry missions intended to evaluate weapon system terminal seeker performance in complex urban scenes, humid environments, infrared countermeasured environments, and shipboard and carrier takeoff and landing environments. Weapon free-flight testing consisted of 11 single-weapon releases against Defense Intelligence Agency-certified realistic and defended targets.

TEST AND EVALUATION ASSESSMENT

AGM-154A (Baseline Variant)

DOT&E's evaluation of the results of Navy Operational Evaluation and Air Force initial operational test and evaluation confirmed that the AGM-154A, in the low-rate initial production configuration, is operationally effective and suitable. Follow-on operational tests to evaluate the effectiveness and suitability of new software and hardware were adequate. Compared to performance during initial operational test, the system tested:

- Demonstrated a 45 percent improvement in accuracy.
- Meets suitable levels of reliability, logistic supportability, and built-in test capability.
- Continues to demonstrate satisfactory performance in a GPS-jamming environment.
- Continues to demonstrate the ability to re-target the AGM-154A in flight; however, the fidelity of onboard sensors in both threshold aircraft for self-targeting does not provide re-targeting coordinates accurate enough to enable a desired level of destruction.
- Meets desired levels for single-shot kill capability, but only in light winds.
- In strong head or tail winds, performance of the AGM-154A may not have improved. Therefore, two AGM-154A weapons should be employed against a single target at perpendicular attack headings to mitigate potential errors in wind estimator performance.

While AGM-154A accuracy improved, the need to employ two weapons per target does not increase the opportunity to hold more targets at risk. If the AGM-154A wind estimator performance in strong head or tail winds does not improve, diminished performance, as seen in February 2001, is possible. If the Baseline system configuration changes, we will require operational testing of this weapon system's full capability in the face of strong head and tail winds.

AGM-154C (Unitary Variant)

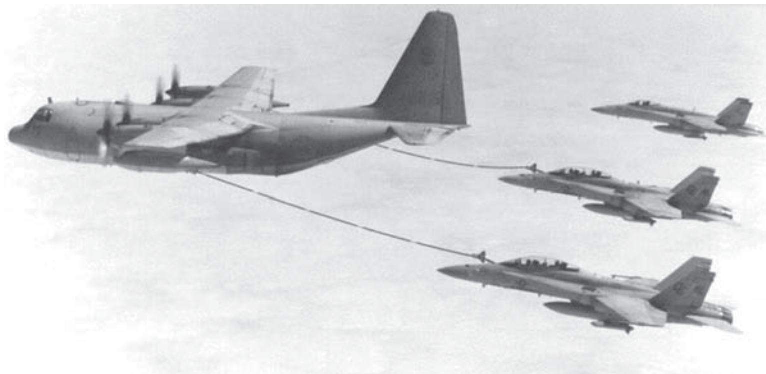
During operational evaluation of the AGM-154C, the weapon impacted the target and detonated during 10 of 11 weapon release events. On one occasion, the weapon revealed a final attack-heading anomaly that necessitated weapon destruction prior to impact on the target. However, an update to weapon software and subsequent operational testing demonstrated correction of the anomaly. Captive-carry missions conducted with the seeker in high humidity and various camouflage, concealment, and deception environments indicate seeker performance is typical of fielded imaging infrared seekers. Although an evaluation of weapon survivability against realistic surface-to-air threat systems was conducted through modeling and simulation, follow-on free flight operational testing of the AGM-154C against a realistic threat array is necessary to confirm weapon survivability modeling and simulation results.

Operational testing also revealed an inability to transfer targeting imagery onboard ship to the mission planning system. Mission planning with the Tactical Automated Mission Planning System resulted in occasional inability to complete mission planning operations. While a software revision introduced during operational evaluation enabled transfer of targeting imagery onboard ship to the mission planning system, the possibility of mission planning interrupts remains. Improvements to the Tactical Automated Mission Planning System to routinely enable completion of mission planning are necessary to render mission planning suitable with the Unitary variant. Operational testing of this software update and the JMPS are necessary before either system is delivered to the fleet.

Weapon impact and detonation of the AGM-154C against all ten operational evaluation targets indicates the warhead is lethal. Results from free-flight tests, along with developmental flight tests, sled tests, and arena warhead characterization tests will support the development of the Joint Munitions Effectiveness Manual.

DOT&E is assessing Unitary variant effectiveness and suitability for combat.

KC-130J Aerial Tanker/Airlift Aircraft



The KC-130J, a variant of the C-130J, is a medium-sized, four-engine turboprop aircraft modified to perform a primary mission of aerial refueling of fixed- and rotary-wing aircraft for the United States Marine Corps.

SUMMARY

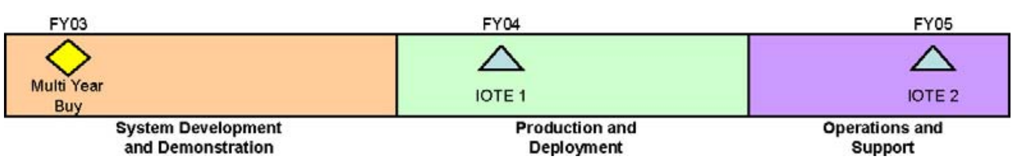
- Marine Corps operational testing (OT-IIIA/B) began in September 2003 to determine the operational effectiveness and suitability for airland, air delivery, and aerial refueling capability, and to support a recommendation for fleet introduction.
- In May 2004, the Marine Corps began OT-IIIC to evaluate the operational effectiveness and suitability of selected KC-130J defensive systems.
- The Marine Corps intends to deploy the aircraft to the Central Command area of responsibility in February 2005.
- There are no Milestone or production decisions. Deficiency corrections are not budgeted before the FY08-FY09 timeframe.

SYSTEM DESCRIPTION AND MISSION

The KC-130J, a variant of the C-130J, is a medium-sized, four-engine turboprop aircraft modified to perform a primary mission of aerial refueling of fixed- and rotary-wing aircraft for the United States Marine Corps (USMC). Secondary missions include rapid ground refueling, assault transport, logistics support, and special warfare, while preserving personnel and cargo transport capabilities. The KC-130J will perform the same missions as the aircraft it will replace, the KC-130F and KC-130R. Procurement of the KC-130J is proceeding under a commercial off-the-shelf acquisition strategy, instituting catalog pricing and commercial payments through the Air Force's C-130J Developmental Systems Office. No milestone decisions are planned for this program.

A Navy/USMC KC-130J test program addresses the key differences in aircraft configuration and mission employment from the baseline Air Force C-130J. The KC-130J program intends to build upon prior contractor, Federal Aviation Administration, and Air Force test efforts and data collection rather than duplicate any tests. The Air Force and contractor tests have been ongoing since 1995.

TEST AND EVALUATION ACTIVITY



The Navy/USMC developmental test and evaluation program completed approximately 1,200 flight test hours. Operational testing (OT-IIIA/B) began in September 2003 to determine the operational effectiveness and suitability for airland, air delivery, and aerial refueling capability, and to support a recommendation for fleet introduction. OT-III A/B ended in January 2004 after covering fixed-wing and rotary-wing aerial refueling, rapid ground refueling, personnel and cargo airdrop, cargo container delivery system, airland at tactical landing zones, and self-deployment of the aircraft. Production representative aircraft, without deficiency corrections identified in Air Force initial operational test and evaluation (Phase 1), and operationally realistic aircrews and scenarios were used during OT-IIIA/B.

The Marines are conducting an abbreviated OT-IIIC of the electronic warfare suite from May-December 2004. The suite consists of infrared and radio frequency warning receivers, plus an automatic expendables dispenser that deploys either flares or chaff. Some performance anomalies have been found, and the results are being analyzed to determine if improvements can be incorporated. The USMC intends to deploy the aircraft to the Central Command area of responsibility in early 2005. Testing has not demonstrated that the defensive system is effective and suitable. An integrated defensive systems test using improved hardware, software, and test procedures is essential before operational crews are required to rely upon system performance in a combat environment. Such a test is planned in spring 2005.

The USMC did not conduct live fire test activities in FY04. Live fire tests of the center fuselage fuel tank are scheduled for FY05.

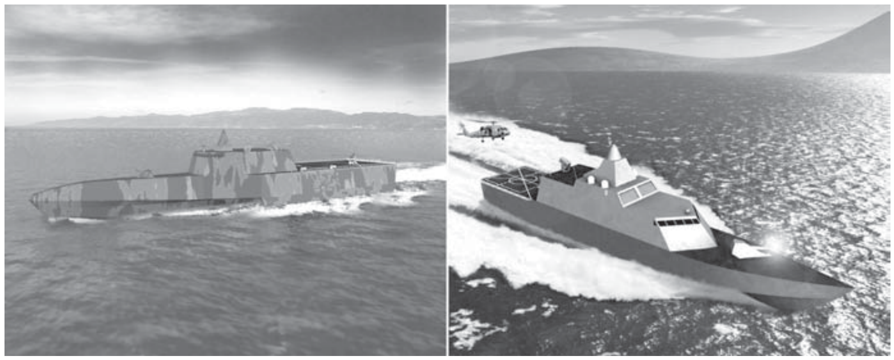
DOT&E approved the KC-130J Test and Evaluation Master Plan and the Operational Test Plan in October 2003.

TEST AND EVALUATION ASSESSMENT

In 2003, a new aerial refueling system initially slated for the KC-130J could not be qualified because of flight safety and operational performance problems. The new refueling pod design was replaced by the existing (legacy) pod used on the KC-130T. Legacy pods were successfully used in OT-IIIA/B, but the rendezvous aids are not as effective as the legacy aircraft and are not adequate for routine training. OT-IIIA/B did not retest any major deficiencies found during earlier phases of operational test for the C-130J. Low mission capable rates continue to hamper all J-model operations. Likewise, an excessive false alarm rate for the built-in test equipment decreases the confidence of operators and maintainers in the diagnostic functions of this highly automated platform. False alarms also increase the maintenance burden to an unacceptable level. Deficiency corrections are not likely before the FY08-FY09 timeframe.

Littoral Combat Ship (LCS)

SUMMARY



LCS will be a small, high-speed ship designed to operate close to shore and ensure access for larger follow-on forces.

- The Program Office selected two contractors for Flight 0 design (the first ship iteration). Four ships, two each of different designs, will make up Flight 0.
- The impact of the Flight 0 testing on Flight 1 designs will be minimal due to the accelerated acquisition timeline.
- Experimental module testing on surrogate ships reduces mission package technical risk.
- The Flight 0 ship design provides Level 1 survivability. The survivability requirement for Flight 1 ships is under review.

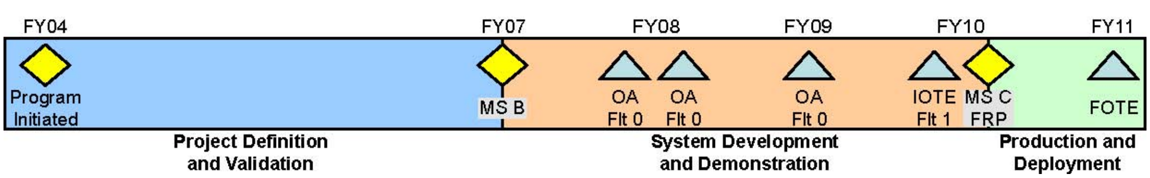
SYSTEM DESCRIPTION AND MISSION

The Littoral Combat Ship (LCS) will be a relatively small, high-speed, maneuverable surface combatant. Envisioned as a networked, agile, and stealthy vessel capable of defeating asymmetric threats, it operates in the near-land littoral region to ensure coastal access for U.S. forces. LCS operates in environments where employing larger, multi-mission ships, such as DD(X) or CG(X), is undesirable. It will deploy independently, in small LCS squadrons, or with strike groups, remaining on station for long periods. It may be forward-based and/or be replenished underway.

In addition to core warfighting capabilities including self-defense and command and control, the LCS relies on interchangeable mission packages to tailor its mission to the current threat. Each mission package relies heavily on both manned and unmanned off-board vehicles. The LCS has three primary or focused mission areas: surface warfare against swarms of small hostile surface craft; mine countermeasures; and littoral anti-submarine warfare. A ship can only carry one mission package so LCS conducts missions in one focused warfare area at a time. Secondary missions include intelligence; surveillance and reconnaissance; Special Operations Forces support; logistic support for movement of personnel and materials; Maritime Interdiction Operations; and Homeland Defense.

A spiral development approach supports accelerated production and deployment goals. LCS development consists of Flight 0 and Flight 1. In May 2004, the program office selected two different ship designs for Flight 0. The current acquisition plan procures two ships of each design for Flight 0. The first Flight 0 ship delivers in late FY07. The Navy will develop the Flight 0 mission packages using already fielded (or soon-to-be fielded) combat systems. Flight 0 ship and mission package construction and Flight 1 ship and mission package design will occur at the same time.

TEST AND EVALUATION ACTIVITY



DOT&E participated in the development of both the Acquisition Strategy and Test and Evaluation Strategy documents for Milestone A. Updates of both documents reflect the current strategy of purchasing four ships of two different designs along with additional mission packages for Flight 0.

The LCS Program Office developed the Capabilities Development Document for Flight 0. There will be a separate Capabilities Development Document for Flight 1 ships. Due to the limited number of ships, there is no Initial Operational Test and Evaluation or major Live Fire Test and Evaluation planned for Flight 0. However, they will undergo several operational assessments.

The Program Office is conducting a robust experimentation program to reduce technical risk in Flight 0 mission packages by testing potential mission modules using surrogate LCS ship platforms. Each of the different hull and mission package designs will undergo an early operational assessment.

TEST AND EVALUATION ASSESSMENT

The accelerated acquisition timeline for LCS leaves limited opportunity to apply construction and operational testing lessons from Flight 0 to Flight 1 hull and mission package designs. Additionally, the two Flight 0 hull designs have overlapping construction schedules. Construction of the first LCS Flight 1 ship will begin about the same time operational testing starts on the first Flight 0 ship, and prior to the delivery of the other Flight 0 ships.

Evaluation of the LCS self-defense capability against anti-ship cruise missiles is required. The program should use the self-defense test ship to conduct adequate and realistic testing against this threat. To assess its anti-surface warfare capability, LCS needs an instrumented shallow water range. Additionally, a shallow water range would be very beneficial, but not critical, in evaluating its mine warfare capability. Threat representative submarine targets will be critical to successfully evaluating LCS effectiveness against diesel submarines.

The design of Flight 0 ships will reflect Level 1 survivability. Level 1 survivability represents the least severe combat environment anticipated. Level 1 survivability is inadequate to sustain operations in the immediate area of an engaged strike group or in the general war-at-sea region. The Navy has agreed to conduct survivability trade-off studies for the design of the Flight 1 ships.

LPD 17 Amphibious Transport Dock Ship

The LPD 17's principal mission is amphibious warfare – to embark, transport, and deploy the combat and support elements of Marine Expeditionary Units and Brigades in assault by helicopters, landing craft, amphibious vehicles, and by a combination of these methods.

SUMMARY

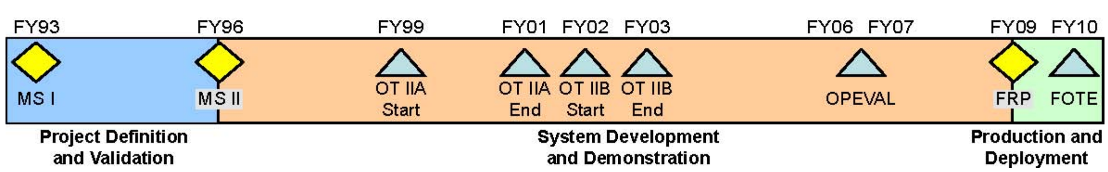
- Operational assessment indicates that LPD 17 should meet its amphibious lift requirements, as well as offer reduced susceptibility and improved habitability compared to the ships that it will replace.
- Concerns include: the ship's combat system effectiveness against fighter/attack aircraft, some types of anti-ship cruise missiles, and torpedoes; adequacy of the command, control, communications, computers, and intelligence systems to support landing force requirements; tactical display management; support of night operations; chemical/biological defense; cargo handling; aircraft maintenance; and ship wide area network vulnerabilities.
- Adequate combat system initial operational test and evaluation (IOT&E) in FY06 will be a significant challenge. The Navy must test LPD 17; test its combat system on the Self Defense Test Ship and on LPD 18; validate the modeling and simulation with Self Defense Test Ship/LPD 18 results; and conduct simulation with the validated models and simulation. Test and Evaluation Master Plan updating is in progress.

SYSTEM DESCRIPTION AND MISSION

San Antonio (LPD 17) is an amphibious assault ship with a flight-deck for the aerial transport of troops and equipment by helicopters and MV-22s. It also has a floodable well-deck for air-cushioned landing craft, conventional landing craft, and current and advanced amphibious assault vehicles. The LPD 17's principal mission is amphibious warfare – to embark, transport, and deploy the combat and support elements of Marine Expeditionary Units and Brigades in assault by helicopters, landing craft, amphibious vehicles, and by a combination of these methods.

Self-defense capabilities of the LPD 17 include the Ship Self Defense System Mark 2 (Mod 2 variant), Rolling Airframe Missile, and the Nulka decoy to provide own-ship defense against anti-ship cruise missiles. Two Mark 46 Mod 1 30mm gun systems and other medium caliber machine guns provide defense against surface threats.

TEST AND EVALUATION ACTIVITY



Navy operational test agency concluded an operational assessment (OT-IIB) in FY04. An assessment team reviewed ship specifications and design drawings and examined results from modeling and simulation conducted as part of the ship design process to assess the ship's expected capability. Test and Evaluation Master Plan updating progressed in FY04. The nearly complete Live Fire Test and Evaluation (LFT&E) Detail Design vulnerability assessment exercises a variety of ship vulnerability models to determine the vulnerability of the *San Antonio* class ships to seven threat engagements, including a USS *Cole*-like scenario. Shot-line runs precede probability of kill given a hit analyses and crew recoverability scenarios. The Navy continued component shock qualification tests. LPD 19 will undergo shock trials vice LPD 17, resulting in a four to five month delay.

TEST AND EVALUATION ASSESSMENT

OT-IIB findings indicate that the LPD 17 provides considerable amphibious lift as well as advances in shipboard application of information technology, reduced susceptibility, and improved habitability for the crew and embarked

Marines, but deficiencies exist. DOT&E agrees with the overall operational assessment findings, including the following:

- **Combat System.** The LPD 17 combat system's effectiveness depends on the integration of sensor, weapon, and control elements. Defense against fighter/attack-type aircraft is a concern. A Rolling Airframe Missile system upgrade to engage helicopters, some aircraft ("low/slow flyers," not jet aircraft), and surface craft will not field in time for LPD 17. There are concerns about the ship's self defense against anti-ship cruise missiles and its susceptibility to torpedoes.
- **Command, Control, Communications, Computers, and Intelligence.** Despite the Navy and Marine Corps' continuing efforts, shortcomings remain in the ship's command, control, communications, computers, and intelligence systems. Three systems considered necessary that are missing are:
  - Joint Operations Planning and Execution System (to originate and validate movement requests among Joint Task Force Service components, the regional Combatant Commander, and U.S. Transportation Command).
  - Theater Battle Management Core System (to coordinate airspace, flight operations, and targeting information in a Joint/combined environment).
  - High Frequency, Automatic Link Establishment radio (to allow reliable inter-/intra-force connectivity by means of HF radio).

  Another system considered necessary—the Advanced Field Artillery Tactical Data System (to support fires)—is not part of the ship's baseline. Although the Navy states that the landing force can bring the needed hardware and software aboard the ship before deploying, this approach introduces integration and Information Assurance concerns. Other essential command, control, communications, computers, and intelligence systems were missing. Although the Navy states that these will be available, their availability for the ship's FY06 IOT&E is not clear. The ship's wide area network is crucial to mission accomplishment and should facilitate improved information technology capabilities. The ship wide area network has Information Assurance-related vulnerabilities, primarily due to internal security shortfalls in areas such as firewalls, intrusion/virus detection software, and network load management.
- **Tactical Display Management.** Real-time tracks from Ship Self Defense System Mark 2 do not fuse with near real time friendly unit positions and control measures provided by nonintegrated systems such as the ship's Amphibious Assault Direction System. System operators and supervisory personnel must manually deconflict the tracks, increasing their workloads and the risk of misclassifying a threat as a friendly or friendly as a threat.
- **Night Operations.** LPD 17 will not fully support concurrent, nighttime, flight-deck and well-deck operations due to incompatible lighting/night vision devices. It is doubtful there will be a solution in time for the LPD 17 IOT&E.
- **Chemical/Biological Defense.** There are no provisions for decontaminating landing craft, aircraft, and landing force equipment in the well-deck or on the flight-deck. This is an issue because the ship must interoperate with landing craft and helicopters that might be exposed to agents while ashore, and then return to the ship in a contaminated state. The ship needs an effective standoff chemical agent detector, but neither that nor a biological agent detector are in the requirements document.
- **Cargo Handling.** The ship carries a substantial amount of cargo, but there are no backup systems for the elevators that service two of the ship's three cargo and ammunition magazines. These two magazines hold approximately 85 percent of the supplies carried aboard the ship. The program is examining an emergency ordnance handling alternative.
- **Aviation Maintenance.** The ship's aviation crane will not be available for LPD 17's IOT&E. As a result, the ship will not have the capability to conduct certain organizational level maintenance actions (such as gearbox, rotor head, and engine replacement) on helicopters and tiltrotor aircraft within the Marine Corps' current and future fleet. LPD 17 should otherwise support landing force helicopters and tiltrotor aircraft.

In addition to LPD 17 testing, the Navy must conduct required testing of the combat system on a Self Defense Test Ship and on LPD 18; validate the modeling and simulation with Self Defense Test Ship/LPD 18 results; and conduct simulation with the validated models. Availability of IOT&E resources, particularly aerial targets, remains a concern.

The LFT&E program continues on track. The survivability of the *San Antonio* class ships should greatly improve that of the 1970's-era amphibious ships it will replace due to the reduced radar cross section signature design features, strengthened hull girder design, improved bulkhead connections, improved fragmentation protection, fire insulation at fire zone boundaries, and maximum use of redundancy and separation for vital systems.

Mark XIIA Identification Friend or Foe (IFF)

SUMMARY

- The Army, Navy, and Air Force have each initiated independent acquisition programs to develop and field Mark XIIA Identification Friend or Foe (IFF) transponders and interrogators.
- DOT&E's initial focus is to develop test plans that are adequate and address issues of joint interoperability, stressing overload situations, and electromagnetic compatibility.
- Ensuring all systems developed by the Services interoperate properly is the most critical aspect of Mark XIIA Mode 5 testing, requiring extensive coordination between the Service operational test agencies. A capstone Test and Evaluation Master Plan for Mark XIIA IFF is the best way to ensure that the necessary Joint testing occurs.
- An FY05 Navy Operational Assessment is the first operational test.

The IFF system is a cooperative question (interrogation) and answer (provided by a transponder) identification system.

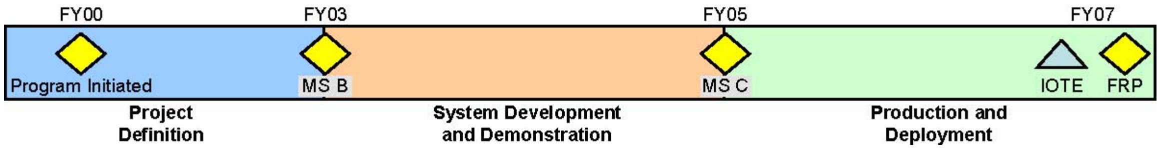
SYSTEM DESCRIPTION AND MISSION

The Mark XIIA IFF system will provide legacy IFF mode capability, as well as the new waveform referred to as Mode 5. The IFF system is a cooperative question (interrogation) and answer (provided by a transponder) identification system. It shares Mode 3 use and radio frequencies with civil air traffic. Mode 5 is a military-only combat identification mode, which will provide modern encryption to ensure the security of interrogations and replies. Mode 5 provides added security and more data transmissions than Mode 4. Additionally, Mode 5 will use a spread spectrum waveform, which should reduce interference with civilian IFF. A new Mode 5 message format with a lethal interrogation mode will help to eliminate fratricide.

The Air Traffic Control Radar Beacon IFF Mark XII System program office is responsible for ensuring all IFF equipment procured by the Services meet specifications. It is not a Joint Program Office, and does not coordinate or manage the Services' various Mode 5 acquisition programs. The Air Traffic Control Radar Beacon IFF Mark XII System program office also certifies Mode 5 systems, and manages and allocates the Mode 5 addresses assigned for military use.
The Army, Navy, and Air Force have each initiated acquisition programs to develop and field Mark XIIA IFF transponders and interrogators. Because the National Security Agency has decertified Mode 4, eventually all military systems using IFF Mode 4 equipment will be required to upgrade to Mode 5-capable equipment. The Navy plans to install Mark XIIA Mode 5-capable systems on all Mode 4-capable surface and air platforms — currently more than 3,000 platforms. The Navy is currently developing airborne and shipboard transponders and a shipboard interrogator. The Navy has deferred, due to funding availability, development and integration of an airborne interrogator for the E-2C and fighter aircraft.

The Army awarded a contract to Raytheon Corporation to develop a Mark XIIA Mode 5 interrogator for all ground-to-air capable host platforms — potentially more than 2,000 systems including all air traffic control, air, and missile defense systems. The Army is planning integration of a Mark XIIA transponder developed by the Navy for Army helicopters.

TEST AND EVALUATION ACTIVITY



DOT&E placed all IFF Mark XIIA acquisition programs on oversight in FY04. Before placed on oversight, the Navy approved the Test and Evaluation Master Plan. The Navy established a Test and Evaluation Working Group Integrated Test Team, and DOT&E is supporting planning of developmental testing/operational testing of prototype Mark XIIA systems. Tests will commence during late FY04 and FY05. The Air Force will participate in the tests with an E-3 Airborne Warning and Control System configured with a prototype Mark XIIA airborne interrogator as a risk reduction effort. The testing will evaluate jamming as well as interrogation and response formats. The Navy is also conducting Mark XIIA interoperability testing with the Italian Air Force during FY05. The Navy will conduct an operational assessment of the Navy Mark XIIA airborne transponders and ship-based interrogators during the second and third quarters of FY05. This operational assessment will support a decision for low-rate initial production of the transponders and ship-based interrogators.

TEST AND EVALUATION ASSESSMENT

The Mark XIIA program requires development and early involvement by the operational tester and DOT&E. The Navy Mark XIIA developmental test will use non-operational host systems (e.g., laboratory and Learjet). However, an adequate operational assessment must include integration of equipment in a combat system.

MH-60R Multi-Mission Helicopter

SUMMARY

- The Program Executive Officer decertified the MH-60R from operational test (OT-IIA) in September 2003 due to poor performance. The test re-started in October 2004.
- A revised Acquisition Program Baseline following de-certification increased developmental testing and changed the low-rate initial production schedule.
- The Navy finished their portion of the Joint Army-Navy live fire test and evaluation program for H-60 variants. Analyses will extend into FY05.

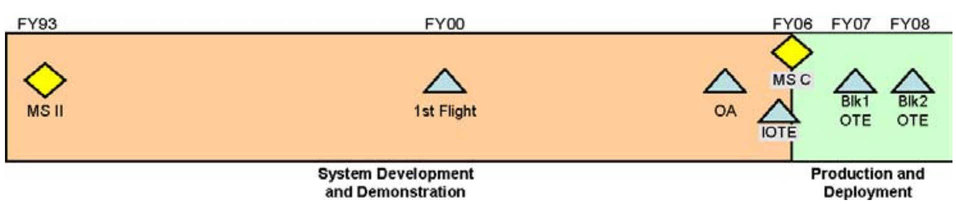
The MH-60R helicopter will replace the SH-60B and SH-60F aircraft and combine their capabilities into a single airframe.

SYSTEM DESCRIPTION AND MISSION

The MH-60R helicopter will replace the SH-60B and SH-60F aircraft and combine their capabilities into a single airframe. The MH-60R primary mission areas are Under Sea Warfare, Anti-Surface Warfare, Area Surveillance and Combat Identification, and Naval Surface Fire Support. The Navy expects the helicopter's new avionics to enhance undersea and surface warfare by improving surveillance, identification, and power projection capabilities. The program develops the AN/AQS-22 Airborne Low Frequency Sonar and the AN/APS-147 Multi-Mode Radar, including Inverse Synthetic Aperture Radar and periscope detection features. Other upgrades include the AN/ALQ-210 electronic support system, the AN/AAS-44 Forward-Looking Infrared sensor, and Hellfire missile capability. The MH-60R will have the Common Cockpit, with multi-function displays and a complex data processing system.

The Army and Navy established a joint live fire test program for the UH-60M, MH-60S, and MH-60R programs to coordinate data collection and reduce costs. The joint effort recognized the high degree of commonality among the different aircraft. Both Services provided airframe components and the prototype YCH-60S aircraft for static and dynamic ballistic testing which began in 2001.

TEST AND EVALUATION ACTIVITY



The Program Executive Officer stopped an operational assessment (OT-IIA) in September 2003 when he decertified the MH-60R from testing due to poor performance. He directed the program re-enter developmental testing to correct defects, complete systems integration, and demonstrate software maturity.

A revised Acquisition Program Baseline in December 2003 extended developmental testing for 12 months, changed milestone exit criteria, added a third low-rate production increment, and reduced the quantity of the second low-rate production increment.

In September 2004, the program office held the Operational Test Readiness Review and the operational assessment

(OT-IIA) started over in October 2004. The MH-60R will undergo formal operational evaluation from May-September 2005. The Navy updated the Test and Evaluation Master Plan in August to reflect the new baseline and revise the test strategy. An administrative change to the Operational Requirements Document, which updates Electronic Warfare key performance parameters, is in staffing. We expect approval of the revised document prior to starting the formal operational evaluation.

The Army and Navy joint Live Fire Test and Evaluation (LFT&E) test program continued both static and dynamic ballistic tests on aircraft components and on the YCH-60S test aircraft. Testing continued throughout the year at the Army's Aberdeen Proving Grounds, Maryland, and at the Naval Air Warfare Center, Weapons Division, China Lake, California. This year's effort completes the Navy portion of the joint tests on H-60 variants. Analytical efforts will extend into FY05.

TEST AND EVALUATION ASSESSMENT

The integration of the Common Cockpit and mission systems in the MH-60R has led to software instability problems. The program office and contractor have made a concerted effort to correct these deficiencies. Results of the ongoing operational assessment will provide greater insight on the stability of the updated software. Navy operational testers have only partially assessed the weapon system and Integrated Self Defense System because their integration wasn't complete during previous test periods.

To provide additional technical risk reduction and save time, the program office scheduled a combined operational assessment and technical evaluation period beginning in October 2004. However, there is only two months between the end of the combined test period and the start of the formal operational evaluation. This may not be enough time to correct deficiencies from the combined test period.

Data from the Joint Army-Navy LFT&E Program, along with legacy H-60 databases, are adequate to evaluate survivability. They indicate the MH-60R will be survivable in its intended operational environment. The MH-60R is damage-tolerant and can withstand multiple small-arms projectile hits. It can continue to fly and often complete its mission in spite of the damage. Data collected since the program's inception include nearly full-up tests of the fuel systems, drive system, rotor blades, and flight controls under realistic dynamic conditions.

MH-60S Fleet Combat Helicopter

The MH-60S will replace the aging fleet of CH-46Ds, most of which have exceeded their original service life.

SUMMARY

- Navy testers reported that their follow-on operational test and evaluation verified the correction of all major deficiencies from the MH-60S operational evaluation.
- Over 70 baseline MH-60S aircraft were in Fleet service by the end of FY04.
- The Navy completed their portion of the Joint Army-Navy live fire test and evaluation (LFT&E) program for H-60 variants in FY04. Analyses will extend into FY05.

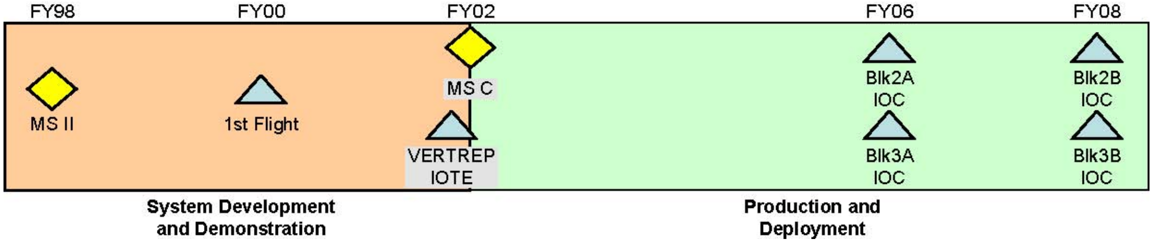
SYSTEM DESCRIPTION AND MISSION

The MH-60S Fleet Combat Support Helicopter will replace the aging fleet of CH-46Ds, most of which have exceeded their original service life. The primary mission of the baseline, Block-1 MH-60S, is to provide vertical replenishment, vertical onboard delivery, ship-to-shore support, and Amphibious Task Force search and rescue. Secondary missions include special warfare support, medical evacuation, and noncombatant evacuation. The Block-2 MH-60S version will perform the Airborne Mine Countermeasure (AMCM) mission. The Block-3 MH-60S, the Armed Helicopter, will conduct Combat Search and Rescue, Anti-Surface Warfare, and Aircraft Carrier Plane Guard missions.

The MH-60S is an Army UH-60L Black Hawk airframe modified slightly for operation in the marine environment and aboard ship. It uses the digital Common Cockpit design used in the MH-60R. It has multi-functional displays and a complex tactical data processing system. Avionics include dual UHF/VHF transceivers, dual Embedded Global Positioning Systems/inertial navigation systems, and night vision device-compatible heads-up displays. The AMCM version will incorporate a data link, a sensor workstation, a winch and tether/towing system, and one of five different mine countermeasure systems. The Armed Helicopter version will include tactical moving maps, a forward-looking infrared sensor with a laser range finder/target designator, crew-served side suppression weapons, Hellfire missiles, forward firing guns and rockets, and an integrated self-defense system.

The Assistant Secretary of the Navy for Research, Development, and Acquisition granted a waiver from full-up system-level live fire testing of the MH-60R under an extension of a July 1996 memorandum. The Army and Navy established a joint LFT&E test program for the UH-60M, MH-60R, and MH-60S development programs. The joint effort recognized the high degree of commonality among the H-60 variants' structural and dynamic components. Both Services provided airframe components and the prototype YCH-60S aircraft for static and dynamic testing which began in 2001.

TEST AND EVALUATION ACTIVITY



During FY04, the focus was on installing the AMCM sensor workstation, and winch and tether/towing system into MH-60S test aircraft. Contractor ground tests of the AQS-20A system and static tow/strain tests of the airframe are in progress.

The Army and Navy joint live fire test program continued static and dynamic tests on aircraft components and on the YCH-60S test aircraft. Testing continued throughout the year at the Army's Aberdeen Proving Grounds, Maryland, and at the Naval Air Warfare Center-Weapons Division, China Lake, California. This year's effort completes the Navy portion of the joint tests on H-60 variants. Analytical efforts will extend into FY05.

TEST AND EVALUATION ASSESSMENT

The 70 baseline MH-60S aircraft in Fleet service by the end of FY04 exceeded the Chief of Naval Operations' Fleet readiness goals. The production line incorporated installation of the 35-pound centrifugal vibration dampers required to reduce vibrations noted during operational evaluation.

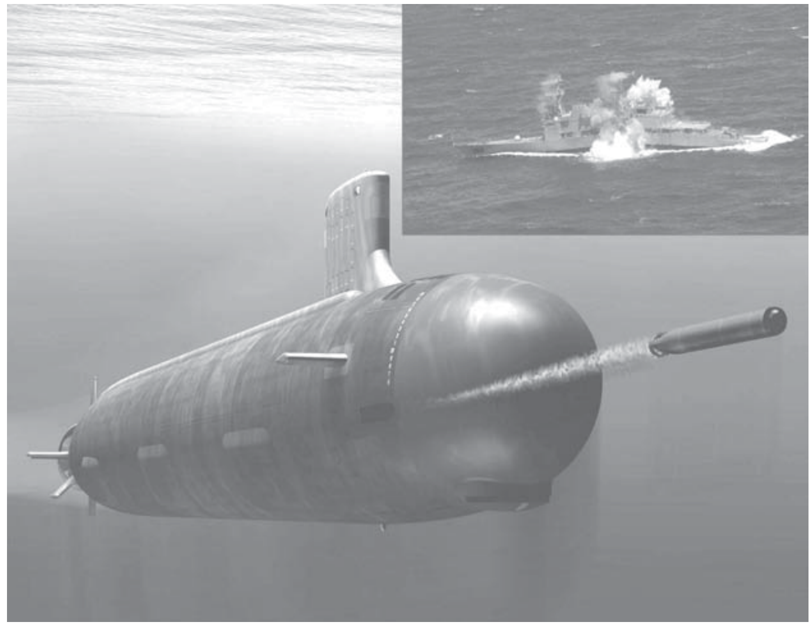
Either contractual or technical delays are affecting development of the five mine countermeasure systems. Delays between 7 and 33 months will adversely impact fielding of a fully capable AMCM version of the MH-60S. Similarly, there is an 8-month delay affecting the Armed Helicopter version.

Live fire test results and legacy H-60 databases indicate the baseline MH-60S is survivable in its intended operational environment. It is damage-tolerant and can withstand multiple small-arms projectile hits, continue to fly, and often complete its mission in spite of damage. The data from the joint live fire test program is adequate to evaluate the survivability of the AMCM version.

MK-48 Advanced Capability (ADCAP) Torpedo Modernization

SUMMARY

- Parts obsolescence requires replacement of Mark 48 Mod 6 Advanced Capability (ADCAP) Torpedo guidance and control hardware and a rewrite of torpedo software. Regression testing of baseline capabilities will occur in FY05.
- The Mark 48 Mod 7 Common Broadband Advanced Sonar System (CBASS) torpedo modernization began initial developmental testing this year.
- Warshot reliability remains a high priority and the program plans to extend its warshot-testing plan.
- DOT&E approved the Mark 48 Advanced Common Torpedo Guidance and Control Box (ACOT-GCB) torpedo Test and Evaluation Master Plan (TEMP) in November 2004.
- DOT&E approved the Mark 48 CBASS torpedo TEMP in October 2004.



Mark 48 ADCAP Torpedo provides submarines a single torpedo type for destroying ships and submarines.

SYSTEM DESCRIPTION AND MISSION

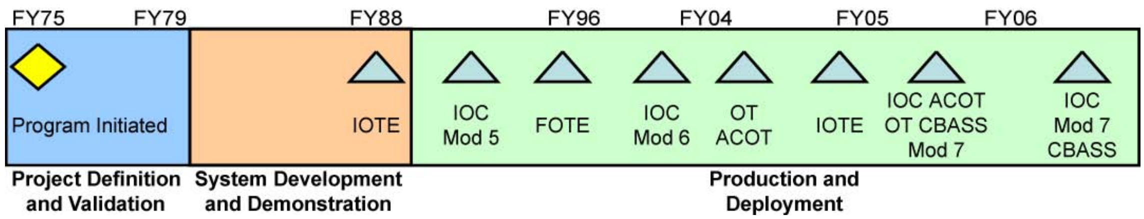
Mark 48 ADCAP Torpedo provides submarines a single torpedo type for destroying ships and submarines in the both deep water open ocean or shallow water littoral environments.

The fleet baselines for ADCAP Torpedo are the Mark 48 Mod 5 and the Mark 48 Mod 6. The Navy plans to introduce a follow-on version of the Mark 48 Mod 6, called the Mark 48 ACOT-GCB, in FY05 in order to replace obsolete components. The next-generation torpedo, the Mark 48 Mod 7 CBASS, planned to start testing in FY05, will incorporate ACOT-GCB parts. The CBASS torpedo is part of a cooperative development program between the United States and Australia.

The Navy designed the ACOT-GCB torpedo to replace obsolescent hardware in the Mark 48 Mod 6. The replacement hardware components are to be “form, fit and function” replacements. The software was rewritten into the C language to conform to the new hardware and to enable open design architecture. The Navy expects ACOT-GCB performance to be similar to the Mark 48 Mod 6. ACOT-GCB operational testing begins in December 2004.

Several software builds are currently under oversight. Block III upgrade is the final tactical software upgrade to the Mark 48 Mod 5. Block IV extends Block III capabilities and applies them to the Mark 48 Mod 6 weapon. The more sophisticated CBASS software follows the Block IV. In lieu of future Block Upgrades, the program plans to employ a series of advanced processor builds (APBs) to both the Mod 6 and CBASS weapons as a more flexible means of introducing software changes. APB testing begins in FY05.

TEST AND EVALUATION ACTIVITY



There was no dedicated operational testing in FY04, but the Navy did conduct numerous ADCAP torpedo exercises. These included four Prospective Commanding Officer exercises, including one exercise conducted jointly with the Royal Australian Navy.

The Navy conducted a sinking exercise (SINKEX) in the Pacific of the ex-USS *John Young* (DDG 973) in April 2004. The event consisted of firing one Mark 48 Mod 6 exercise torpedo, for data collection purposes, and one Mark 48 Mod 6 warshot torpedo to sink the destroyer.

DOT&E participated in drafting the TEMP revisions for the ACOT-GCB, and CBASS programs. The Navy plans an operational test for ACOT-GCB in FY05 and for the initial phase of CBASS developmental testing in FY05. For ACOT-GCB, which is designed to deliver the same performance as the legacy Mod 6 hardware, DOT&E supports plans to test the two guidance and control sections side-by-side in the Navy's Weapons Analysis Facility (WAF) hardware-in-the-loop simulator. A limited set of in-water confidence tests will supplement data from these simulations. The verification, validation, and accreditation of the WAF completed in FY04. DOT&E approved the Mark 48 CBASS TEMP in October 2004. DOT&E approved the Mark 48 ACOT-GCB TEMP in November 2004.

TEST AND EVALUATION ASSESSMENT

Following the failure of two Mark 48 Mod 6 warshots during a 2003 SINKEX, the Navy conducted an investigation and determined that weapon reliability was the likely cause. In response, the Navy instituted a flag-level Warshot Reliability Action Panel (WRAP), designed to focus on torpedo production, maintenance, and reliability issues. One of the panel's recommendations was an immediate increase in warshot test firings. The Navy prepared for two separate warshot tests near the end of 2003; however, circumstances beyond the Navy's control cancelled both events. In April 2004, the Navy conducted a successful SINKEX with torpedoes deliberately chosen from a batch with predicted low reliability. The positive results were gratifying, but the Navy needs to continue to test in order to better understand and improve weapon reliability.

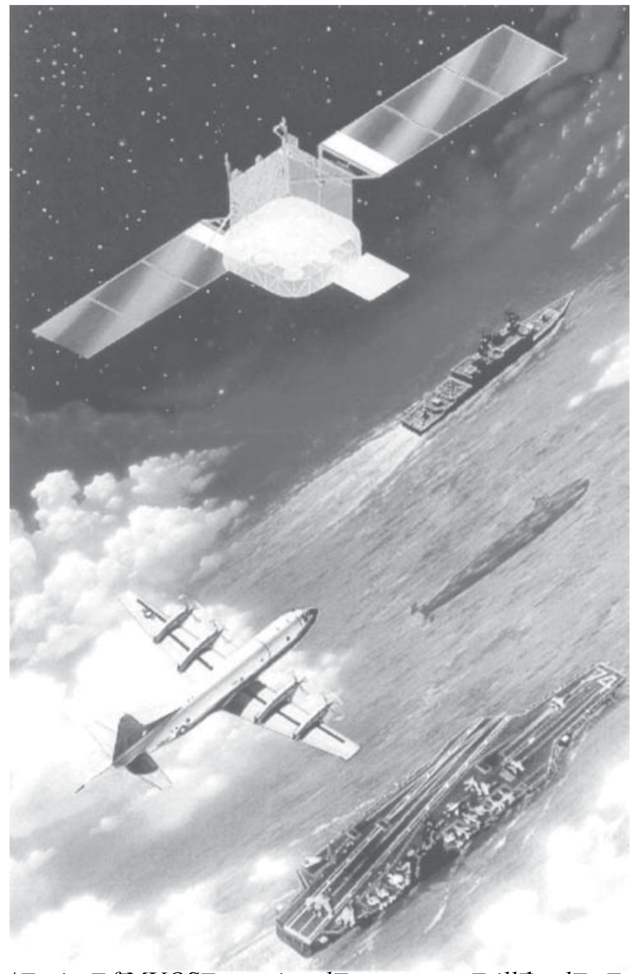
DOT&E participated in the validation process for the WAF, which the program accepted in August 2004. Overall, compared to earlier WAF validation efforts in 1997, the recent WAF runs were more repeatable and consistent with in-water data. Much of this appears to be due to improvements in the simulation, particularly with respect to target and environmental modeling. While it is inappropriate to rely solely on the WAF to generate actual torpedo effectiveness results for purposes of operational testing, the simulation should provide a test bed for the side-by-side comparisons planned for the ACOT-GCB OT&E and for regression testing.

The new level of cooperation between the U.S. Navy and the Royal Australian Navy provided valuable opportunities for training and testing, particularly against diesel-electric submarines. In addition, the Australian and U.S. joint CBASS program is developing a portable tracking range for CBASS testing in Australia. However, some torpedo performance questions remain unresolved due to inadequate test and evaluation resources and funding provided by the Navy. For open-ocean shallow water exercises, the tested torpedo's internal monitoring equipment is the only source of data, resulting in post-run analysis biases and errors. Development of other mobile test ranges or other independent instrumentation will alleviate shallow water testing shortfalls. As a more permanent solution, given the high priority of the diesel submarine threat, an instrumented shallow water test range in a threat representative environment would aid in maturing littoral Submarine Warfare tactics and torpedo performance improvement in shallow water. The cumbersome nature of open ocean torpedo firings, coupled with seasonal marine mammal habitat restrictions at many locations, has significantly lengthened development cycle times. The Navy needs to support funding for a viable instrumented shallow water test range.

Mobile User Objective System (MUOS)

SUMMARY

- The Mobile User Objective System (MUOS) has the potential to provide improved joint interoperability for deployed forces, increased capacity and throughput, multi-hop capability, communications-on-the-move, and additional support for disadvantaged terminals.
- There are potential schedule and technical risks due to technical complexity of spacecraft, ground and software elements, dependency on successful implementation of the DoD Teleport and the Joint Tactical Radio System, and dependency on design architecture spectrum requirements.
- Failure to launch MUOS by FY09 could potentially impact ultra-high frequency constellation availability as older ultra-high frequency follow-on satellites go out of service.



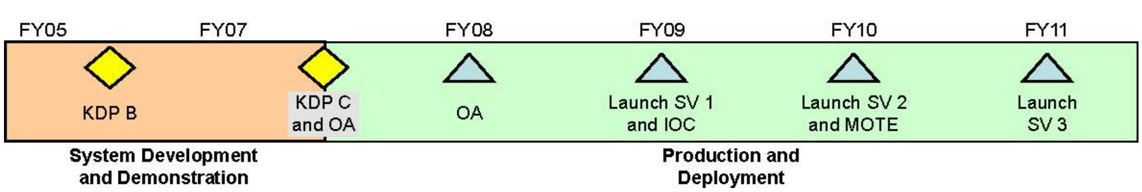
A series of MUOS operational assessments will lead up to a multi-Service operational test and evaluation.

SYSTEM DESCRIPTION AND MISSION

MUOS is a satellite communications network designed to provide a worldwide, multi-Service population of mobile and fixed-site terminal users with narrowband beyond line-of-sight communications services. Capabilities will include a considerable increase from current narrowband satellite communications capacity, as well as significant improvement in availability for small, disadvantaged terminals. The MUOS will provide graceful transition from the current ultra-high frequency follow-on narrowband satellite communications system. The MUOS consists of the space segment, the ground transport segment, the user entry segment, the network management segment, the satellite control segment, and the ground infrastructure segment.

The MUOS is being acquiring under new DoD National Security Space Policy directives tailored for space programs. Two contractors have now completed their efforts under the Component Advanced Development phase. One of these two contractors will be selected to continue into the Risk Reduction and Design Development phase following Key Decision Point (KDP)-B. KDP-B will authorize the prime contractor to develop and procure the first two satellites and associated ground infrastructure. There will be a single contract for design, development, production, and fielding of the MUOS through Final Operational Capability. The combined KDP-C and Options Buy Decision will authorize the procurement and fielding of the remaining system. It will follow the Critical Design Review and be implemented though contract options that execute the Acquisition and Operations Support phase.

TEST AND EVALUATION ACTIVITY



A Combined Test Force developed the evaluation strategy and was written with approval by the Office of the Secretary of Defense occurring in February 2004. The Test and Evaluation Master Plan is in draft with submission to DOT&E for approval slated to occur 180 days after KDP-B. A series of MUOS operational assessments will lead up to a multi-Service operational test and evaluation. The operational test agencies, led by the Navy's Commander, Operational Test and Evaluation Force, conducted an early operational assessment in late 2003 based on technology demonstrations and detail design information presented during design reviews at the two competing contractor facilities. There will be an operational assessment in preparation for the KDP-C and a second operational assessment in support of the launch of the first space vehicle. Dedicated operational test and evaluation will take place after the launch of the first satellite in FY08.

TEST AND EVALUATION ASSESSMENT

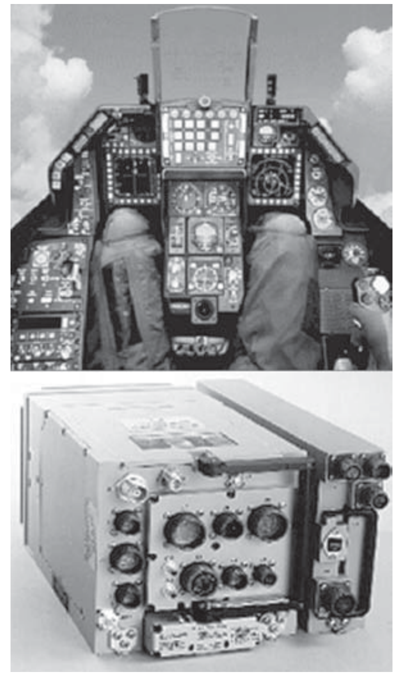
The operational test agencies conducted a very thorough early operational test and evaluation and DOT&E agrees with the observations and conclusions of that assessment. Each contractor design offers both unique advantages and areas of risk, which cannot be reviewed in this report due to the competition-sensitive nature of this information. Risks to achieve effective communications include successful allocation of additional operating frequencies, potential interface issues between the MUOS system and the DoD Teleport, design of the space to ground feeder link, design of the automated network management system, the geolocaton function, and development and certification of cryptographic hardware.

It is very important that there be a strong liaison and test program interconnecting the MUOS program with the Joint Tactical Radio System program. The assessment of system capacity provides the operational test agencies with a challenge and opportunity to develop a common, commercially-based modeling and simulation capability to augment hardware testing with modeling and hardware-in-the loop simulation capability.

Multifunctional Information Distribution System - Low Volume Terminal (MIDS-LVT)

SUMMARY

- DOT&E submitted a beyond low-rate initial production report to Congress. The report stated that tests were adequate to determine that the Multifunctional Information Distribution System - Low Volume Terminal (MIDS-LVT), as integrated into the F/A-18 aircraft was operationally effective, but not operationally suitable. Residual issues include digital voice quality and maintainability.
- The MIDS-LVT follow-on test and evaluation will be conducted using the F-16 as the host platform and is expected to be completed during FY05.



The MIDS-LVT follow-on test and evaluation will be conducted using the F-16 as the host platform.

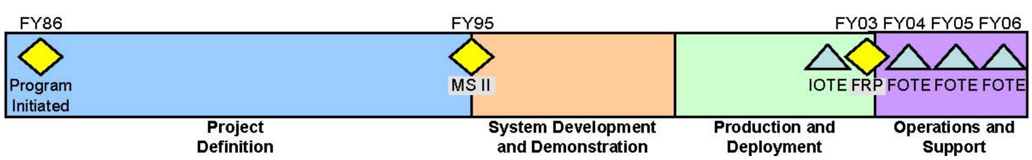
SYSTEM DESCRIPTION AND MISSION

The MIDS-LVT is a communications terminal that provides Link 16 digital data link, digital voice, and, for fighter aircraft, Tactical Air Navigation (TACAN) capabilities when integrated into the host platform. Link 16 is a joint and allied digital data link. It operates on an anti-jam waveform and uses standardized message sets to exchange theater tactical information such as air tracks, engagement orders, targeting information, and platform status. MIDS-LVT provides host platform interoperability with legacy Class II Joint Tactical Information Distribution System-equipped host platforms. MIDS-LVT I has two continuously competing development and production contractors: Data Link Solutions, Incorporated and Via Sat, Incorporated.

Plans are to acquire 1,880 terminals for the MIDS-LVT I and MIDS-LVT II for 13 separate host platform types. The F/A-18 is the Navy's lead host platform and the F-16 (Blocks 40 and 50) is the lead platform for the Air Force for MIDS-LVT I. The integration of the MIDS-LVT I into the F/A-18 served as the primary basis for the MIDS-LVT I initial operational test and evaluation. The F-16 is approximately one year behind the F/A-18 in terms of integration and test schedule.

The MIDS-LVT I provides a digital TACAN function for the F/A-18 and F-16 fighter aircraft. This allows removal of the current AN/ARN-118 analog TACAN to provide the physical space needed to install the MIDS-LVT I and its remote power supply. The TACAN function provides air-to-ground and air-to-air modes of navigation information.

TEST AND EVALUATION ACTIVITY



DOT&E supported planning of the follow-on test and evaluation of the MIDS-LVT I. This included planning for integration, joint interoperability, and suitability testing of the integration of the MIDS-LVT 1 into the Block 50 F-16 fighter aircraft and Electronic Attack (EA)-6B aircraft.

DOT&E is analyzing test data from the operational assessment of the MIDS-LVT integrated in the Block 50 F-16 aircraft. Emerging results indicate improvements in reliability; however, built-in test false alarms are exceeding the requirements threshold by as much as 30 percent.

F-16 aircrews have consistently rated the situational awareness provided by Link 16 through MIDS-LVT I as a positive mission enhancement. It provides exceptional threat awareness, targeting coordination, and flight safety. The testing organizations have several recommendations to include larger displays, implementation of additional messages related to targeting, and improved display mechanization and integration to increase aircrew situational awareness.

TEST AND EVALUATION ASSESSMENT

The Link 16 data link, enabled in host platforms by hardware such as the MIDS-LVT, requires a program that increases throughput and joint interoperability. Stressed capacity limits are due to many additional Link 16 host platforms and mission areas. The MIDS-LVT program office and host platform program managers should continue to locate and correct the causes of built-in test false alarms. This will restore aircrew and maintainer confidence in the MIDS-LVT fault detection and isolation system.

The Department of Defense and the Services should undertake a coordinated effort to increase Link 16 throughput capacity and improve Link 16 joint interoperability as an interim step until the Joint Tactical Radio System family of communications systems implements the new Wideband Networking Waveform.

Multi-Mission Maritime Aircraft (MMA)

SUMMARY

- The Navy selected Boeing as the prime contractor for the Multi-mission Maritime Aircraft (MMA) in June 2004, and will use a modified commercial Boeing 737-800 jet as the airframe.
- The MMA passed the Milestone B decision in May 2004 and entered the System Development and Demonstration phase.
- The Navy requires an updated Test and Evaluation Master Plan.

The MMA will conduct armed maritime and littoral surveillance and reconnaissance missions.

SYSTEM DESCRIPTION AND MISSION

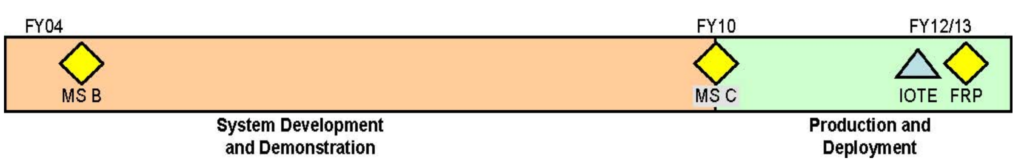
The MMA will be the next generation U.S. Navy maritime patrol aircraft, based on an extended range Boeing 737-800 aircraft. The MMA will carry and employ anti-ship missiles, air-to-surface weapons, depth bombs, torpedoes, naval mines, sonobuoys, and other expendables. The MMA will also have onboard sensors, including radar and electro-optical sensors, and will be able to process data received from off-board sensors.

The MMA will replace the Navy's aging P-3 Orion aircraft, which is reaching the end of its service life. In addition, the Navy's P-3 fleet suffers from poor mission availability rates, high ownership costs, limited system growth capacity, interoperability deficiencies, and lack of an integrated survivability suite.

The MMA will conduct armed maritime and littoral surveillance and reconnaissance missions, with the primary missions being persistent anti-submarine warfare and anti-surface warfare. The MMA must be able to search for, detect, locate, track, classify, and identify surface, subsurface, and littoral land-based targets and deny, disrupt, or destroy them. The MMA must also provide a flexible and responsive intelligence gathering capability; and process, evaluate, and disseminate surveillance and reconnaissance information to Naval and joint forces.

A fielded MMA will be in block increments of increasing operational capability. The initial production block must provide an overall mission capability no less effective than the latest configuration of the P-3C aircraft, namely, the P-3C Anti-surface Warfare Improvement Program and the Block Modification Upgrade Program.

TEST AND EVALUATION ACTIVITY



The MMA program entered Component Advanced Development work in January 2002. The Component Advanced Development phase included competitive contracts to Lockheed Martin for the Orion 21 aircraft (a P-3 derivative aircraft)

and to Boeing for a military derivative of the 737 aircraft. This phase consisted of refining system requirements, development of concept architectures, risk analysis and mitigation, and detailed lifecycle cost analyses. Data from the Component Advanced Development phase allowed the Navy to conduct a technology readiness assessment and provided data for the selection of the prime contractor.

The May 2004 Milestone B decision approved entry of the MMA program into the System Development and Demonstration phase. Shortly afterwards, the Navy chose the Boeing 737-800 airframe as the MMA platform. Of the seven initial aircraft built, the first three will be for System Development and Demonstration Phase I. The last four aircraft supports System Development and Demonstration Phase II for developmental and operational testing. A low-rate initial production of 34 MMA aircraft will allow establishment of the production base and prevent a break in the production line.

The MMA program completed a TEMP in FY04 to support the Milestone B decision. The TEMP provided a generic template for the test program, which included considerable testing in a systems integration lab, airworthiness flight-testing, developmental testing, and operational testing.

The Under Secretary of Defense for Acquisition, Technology, and Logistics approved a waiver from full-up, system-level live fire test in March 2004. DOT&E approved the Alternative Live Fire Test plan on January 21, 2004. The alternative plan requires the Navy to complete a system level survivability assessment. The Navy will develop live fire vulnerability ballistic test plans on major components based on the survivability assessment findings. Component level testing of aircraft (fuselage, wings, engines, nacelles, etc.) is a long-standing practice for determining and reducing the aircraft's vulnerability.

TEST AND EVALUATION ASSESSMENT

The updated Test and Evaluation Master Plan will need to provide a clear picture of the operational missions during the test program, the definitions of mission accomplishment, testing conditions, and the interactions with other needed systems for mission accomplishment.

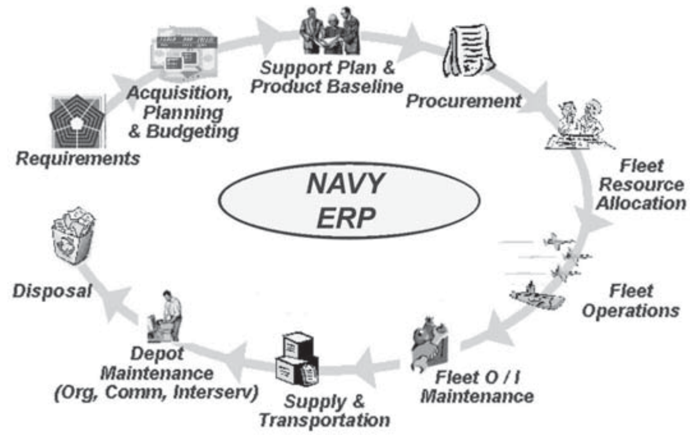
Reasonable assurance of a successful execution of the MMA program requires resolving several identified risk areas. First, the integration of the onboard sensors, data processing capabilities, and weapons stores will be perhaps the most significant technological challenge. Second, closely monitoring weight growth is critical onboard the aircraft to prevent impacting aircraft flying range. Third, the MMA must be interoperable and well integrated with the rest of the family of systems making up the Navy's Broad Area Maritime and Littoral Armed Intelligence, Surveillance, and Reconnaissance mission. These systems include the Broad Area Maritime Surveillance Unmanned Aerial Vehicle and the Distributed Common Ground/Surface System-Navy.

Finally, the acquisition program for the MMA proposes to buy 34 aircraft as low-rate initial production out of a total buy of 115 aircraft. The large low-rate initial production buy will necessitate a significant amount of test and evaluation early in the program, especially in the system integration lab and during early flight-testing.

Navy Enterprise Resource Planning (ERP) Program

SUMMARY

- The Navy Enterprise Resource Planning (ERP) program is perhaps the largest and most advanced of the Service ERP efforts.
- The program achieved Milestone A/B near the end of FY04 and will soon purchase commercial off-the-shelf ERP software and hire an integration contractor.
- DOT&E approved a comprehensive Test and Evaluation Master Plan. With selective updating as more information is developed, it will adequately support initial operational test and evaluation during FY06.



The Navy ERP program is perhaps the largest and most advanced of the Service Enterprise Resource Planning efforts.

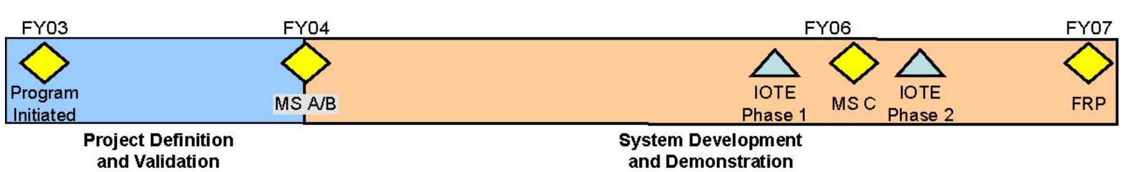
SYSTEM DESCRIPTION AND MISSION

The Navy ERP program is perhaps the largest and most advanced of the Service Enterprise Resource Planning efforts. It will completely revamp the way the Navy provides combat service support. The key objective of Navy ERP is to act as a catalyst for transforming key acquisition, logistics, and financial business activities. It will form an integrated network of decision-making processes and business activities. The Navy wants to capitalize on demonstrated ERP technology advances in creating and disseminating decision-making information. The program expects to exhibit operational integration, economy-of-scale leverage, and legacy system and software consolidation. In addition, the program will improve functional area metrics and measurement. It will use proven best business and commercial practices. The program will pursue an evolutionary acquisition strategy with incremental deployment.

In December 1998, the Navy established four ERP pilots as enablers for significant business process reengineering. These pilots are in use at four major Navy commands: Naval Air Systems Command, Naval Sea Systems Command, Naval Space Warfare Command, and Naval Supply Systems Command. Recognizing the potential for applying best commercial business practices to improve Navy business operations, each pilot focused on a commercial ERP product. The Navy selectively modified each product and tested a separate facet of Navy business. Integrators evaluated the commercial off-the-shelf software used for reengineering specific business practices within limited user groups. It soon became clear that combining the pilots into one program would yield a more concrete revolution. In late FY02, the Navy directed convergence of the pilots to produce a single system.

The Joint Requirements Oversight Council approved the Navy ERP Operational Requirements Document on August 12, 2004. The system achieved Milestone A/B on August 23, 2004. This milestone gave the program manager the authority to purchase the ERP software and to hire an integration contractor. If operational test and evaluation is successful, the system could be operational by the end of FY06.

TEST AND EVALUATION ACTIVITY



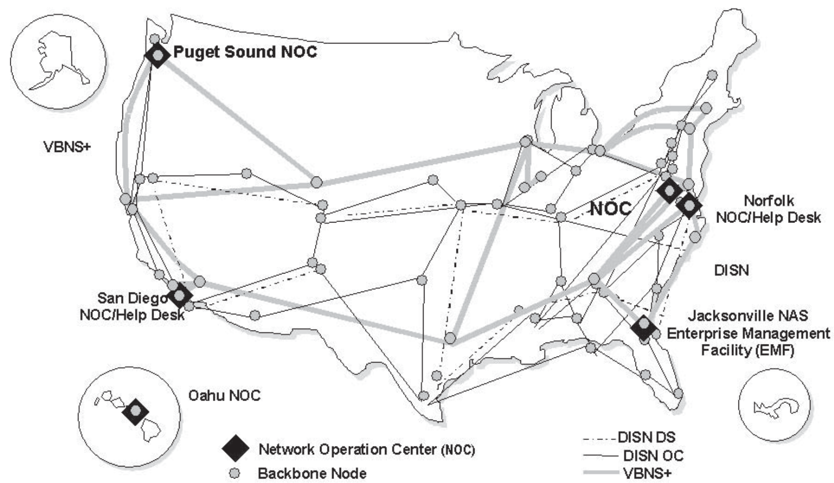
DOT&E approved a comprehensive Test and Evaluation Master Plan supporting operational test and evaluation that the program manager and testers will update as required. The Navy's Operational Test and Evaluation Force expects to participate in developmental/operational testing during 3QFY05. They will conduct independent test and evaluation in two phases, starting in 2QFY06. In the first phase, the operational testers will test a deployable-representative system in a laboratory test environment. They will use representative fleet operators to resolve as many critical operational issues as possible. If supported by test results, the Navy will field the system to the initial deployment sites. The Commander, Operational Test and Evaluation Force will then conduct field-validation testing at the initial deployment sites to resolve the remaining issues.

TEST AND EVALUATION ASSESSMENT

Since testing and evaluation has not yet begun, we cannot assess it. We predict that the Navy's experience with four pilot ERP systems will prove very helpful in planning and conducting meaningful test events.

Navy Marine Corps Intranet (NMCI)

SUMMARY



NMCI is an information technology services contract to provide reliable, secure, and seamless information services to the shore-based components of the Navy and Marine Corps.

- The Navy operational testers conducted an operational evaluation (OPEVAL) of the Navy Marine Corps Intranet (NMCI) during October-December 2003. DOT&E identified six major problem areas during the OPEVAL that must be corrected for NMCI to become operationally effective and suitable.
- The problem areas are information assurance, customer service and support, network support, mission support, maintainability, and logistic supportability.
- The program office is currently addressing these problems, and the Navy operational testers will verify corrections when completed.
- The Navy and the contractor are reviewing the NMCI contract requirements and specifications for relevance.

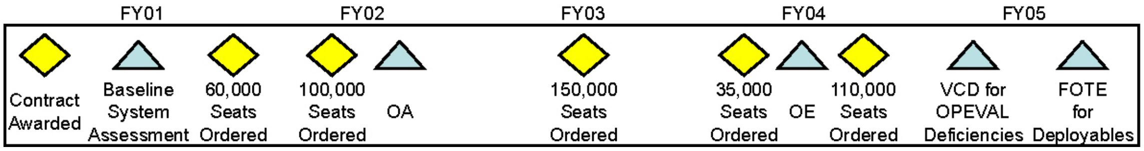
SYSTEM DESCRIPTION AND MISSION

NMCI is an information technology (IT) services contract to provide reliable, secure, and seamless information services to the shore-based components of the Navy and Marine Corps. NMCI infrastructure and services will not extend to afloat or deployed units. NMCI is required to support new processes and enable new initiatives such as knowledge management, distance learning, and telemedicine to improve the quality of life for Department of the Navy employees and support personnel. NMCI will provide IT services using a seat management contract that delivers comprehensive information services through a common computing and communications environment. The NMCI program will implement upgrades, modernization, and technology refreshment over the NMCI contract lifecycle.

The architecture will support Navy and Marine Corps bases, camps, stations, and activities in the Continental U.S., Alaska, Hawaii, Puerto Rico, and Guantanamo Bay, Cuba, for an estimated 455,000 seats. NMCI will not provide direct support to Navy units afloat or deployed; however, NMCI will connect with and provide network access service to Navy ships docked in the NMCI-supported areas. The Navy anticipates that, in order to meet the service level agreements (SLAs) and provide service for the estimated user base, 72 server farms, 6 Network Operations Centers, and 2 Help Desk Centers will be required.

The NMCI initiative differs from a traditional DoD acquisition program, where the government purchases a complete system and then assumes configuration control and lifecycle maintenance and management responsibility. The NMCI contract is for the procurement of IT services (not systems) based upon a commercial model of SLAs. This model emphasizes the verification, validation, and monitoring of the end-user services, not the underlying infrastructure or systems.

TEST AND EVALUATION ACTIVITY



The Navy operational testers conducted the OPEVAL of NMCI between October and December 2003 on operational systems. There were approximately 26,700 participants working in their normal operational environments at the following test sites: Naval Air Systems Command, Patuxent River, Maryland; Naval Air Facility, Washington, DC; Naval Air Station, Lemoore, California; Naval Air Reserve Center, Lemoore, California; Fleet Forces Command, Norfolk, Virginia; and Network Operations Centers and Help Desks in Norfolk, Virginia, and San Diego, California. Typical users performed their usual duties using NMCI at these sites.

During the OPEVAL, the testers collected data from various sources, including help desk trouble tickets, contractor-provided SLA performance data, interviews with users, web-based user surveys, test site commanders' reports, and other sources. Over 5,500 users responded to survey requests. An independent Army agency, the Information Systems Engineering Command, evaluated and validated the extraction procedures for the SLA performance data. The Joint Interoperability Test Command provided additional data in its evaluation of interoperability requirements for the joint critical applications, and the Navy Fleet Information Warfare Command provided its report of information assurance testing.

TEST AND EVALUATION ASSESSMENT

Regarding overall test adequacy, the contractor-collected data for SLA performance was incomplete and significantly flawed. Significant test limitations included the inability to evaluate certain capabilities not yet installed, such as voice-over-Internet, video teleconferencing capabilities, public key infrastructure usage, deployables, newsgroups, and pier-side connectivity. The Navy plans to evaluate these capabilities in a follow-on operational test and evaluation scheduled for 4QFY05.

The Navy Fleet Information Warfare Command found that the NMCI had made some improvements in information assurance, but several critical problems remain. The majority of discrepancies noted during the OPEVAL were also present during the operational assessment in October 2002. Regarding interoperability, the Joint Interoperability Test Command concluded that too few joint applications had been tested to permit a meaningful assessment.

Although NMCI has made some improvements, it has made only minor progress in addressing the major problem areas since the operational assessment in 2002. The following six areas exhibited significant problems during the OPEVAL:

- Information Assurance
- Customer Service and Support
- Network Support
- Mission Support
- Maintainability
- Logistic Supportability

The level of customer satisfaction has improved, but only slightly. The effects of poor customer service and support ripple far beyond the test events and users surveyed, and should receive immediate attention.

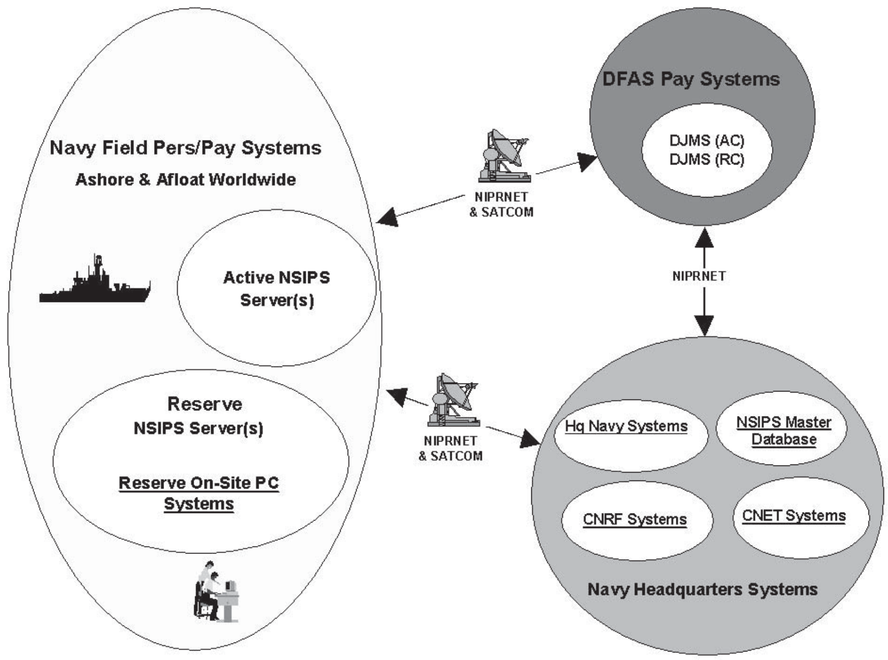
The errors and omissions in the SLA data reported by the contractor during the OPEVAL strongly suggest that the current reporting practice is insufficient to inform the government properly of the operational status of NMCI.

Navy operational testers will evaluate the program office's corrections to more than 25 OPEVAL deficiencies during a Verification of Correction of Deficiencies beginning in 2QFY05.

Navy Standard Integrated Personnel System (NSIPS)

SUMMARY

- The Navy Standard Integrated Personnel System (NSIPS) Release 1 is operationally effective and operationally suitable with several human factors deficiencies remaining.
- The Navy conducted the Initial Operational Test and Evaluation of Release 1 in 2002. Those test results showed that the release was neither operationally effective nor operationally suitable.
- The Navy operational testers conducted Verification of Correction of Deficiencies (VCD) in March 2003 and January 2004. Test results showed that the system performance had improved significantly.



NSIPS will become a standard, single point-of-entry system for all personnel and pay information.

SYSTEM DESCRIPTION AND MISSION

The NSIPS consolidates the Navy Active and Reserve personnel data collection systems, both ashore and afloat. NSIPS will become a standard, single point-of-entry system for all personnel and pay information. The primary interfaces for NSIPS will be with systems of the Defense Finance and Accounting Service. The client-server architecture will have information stored at the local level and at the regional level. Further, NSIPS provides a corporate-level database for planning and analysis purposes.

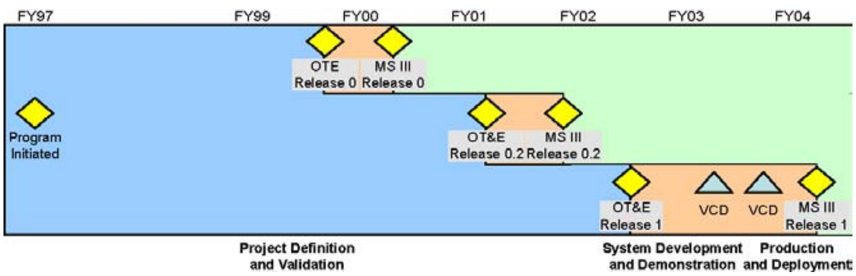
In 1997, the program manager developed a prototype system to prove the planned architecture and "user friendliness" of the graphical user interface. The Navy selected *PeopleSoft*® as the basic human resource software package. The developer had to customize the Release 0 package to address Navy Reserve requirements. The Release 0 operational evaluation (OPEVAL) began in mid-September 1999. Testers noted many deficiencies, including inaccurate transmittal logs, missing e-mail functionality, corrupted reports, and inadequate training. The program manager immediately developed a plan of actions to address these shortcomings. Beginning in October 1999, the program manager installed three separate software builds to fix the problems, and OPEVAL resumed in November 1999. In January 2000, DOT&E concurred with the Commander of Operational Test and Evaluation Force's (COMOPTEVFOR) conclusion that NSIPS Release 0 is operationally effective and operationally suitable, and recommended approval for fleet introduction. NSIPS Release 0, which replaced the Reserve Standard Training, Administration, and Readiness Support (Manpower and Personnel) System, is currently operational at 260 reserve sites.

In June 2000, the program manager proposed that Release 1 be delivered in two separate increments. The first increment (Release 0.2) would address personnel actions and the second increment (Release 1) would address pay actions for the Navy Active force. The Navy conducted OPEVAL of Release 0.2 from in April to May 2001. The results indicated that two effectiveness and eight (of ten) suitability critical operational issues were resolved satisfactorily. Testers found the

interoperability and documentation areas unsatisfactory. The program manager subsequently made corrections and the Navy conducted a VCD in July 2001. Test results indicated that the program manager had corrected the previously identified deficiencies. DoD approved NSIPS Release 0.2 for fleet introduction in September 2001.

COMOPTEVFOR conducted the OPEVAL of NSIPS Release 1 in June and July 2002 at seven operational test sites. OPEVAL results revealed that, while NSIPS Release 1 was able to meet many of its required performance thresholds, it did not meet the key performance parameter of 98 percent accuracy in processing personnel or pay transactions (NSIPS achieved only 89 percent accuracy). Of the 13 external system interfaces, the Joint Interoperability Test Command certified only six as interoperable. Because of these and other deficiencies, COMOPTEVFOR considered NSIPS Release 1 not operationally effective and not operationally suitable for fleet introduction. DOT&E concurred and required a VCD to confirm corrections to the identified deficiencies.

TEST AND EVALUATION ACTIVITY

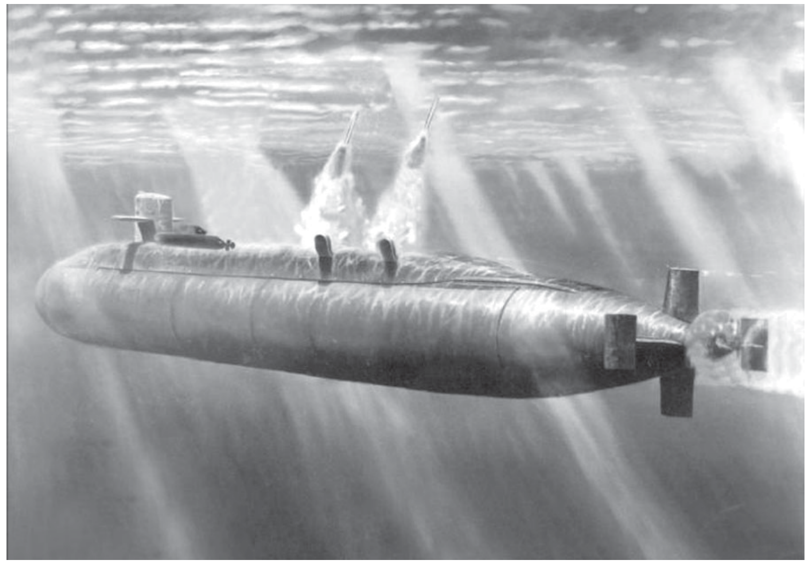


On March 10-19, 2003, COMOPTEVFOR conducted a VCD at Personnel Support Detachment (PSD) Newport, Rhode Island, PSD RTC Great Lakes, PSD Guam, and PSD Point Loma, California to verify the corrections. Test results showed that while the system was operationally effective, it was not operationally suitable. In January 2004, COMOPTEVFOR conducted another VCD to verify corrections to the remaining problems.

TEST AND EVALUATION ASSESSMENT

The January 2004 VCD results indicated that the developer had rectified all previously identified deficiencies, but some human factors deficiencies remained. Several of these human factors deficiencies are associated with Navy policies. For example, NSIPS Release 1 does not allow for assisting customers other than those assigned to the command, and does not provide flexibility when assisting reservists and officer accessions (for security and information integrity reasons). Further, NSIPS halts order processing upon encountering errors and it does not allow PSD to correct erroneous data without intervention from the Navy Bureau of Personnel. Other human factors deficiencies identified were report formatting and dependent data entry. DOT&E recommended that the program manager work with the functional proponent to review existing Navy policies with regard to assisting customers not assigned to the command and providing more flexible support to reservists and officer accessions.

Ohio SSBN Class Conversion to SSGN



Ohio *class cruise missile submarine entails the conversion of the four SSBNs to dedicated cruise missile submarines to support the Land-Attack/Strike and Special Operations Forces missions.*

SUMMARY

- The SSGN Test and Evaluation Master Plan, signed in August 2002, required revision to reflect changes in the program schedule and test program. The revision will complete in early 2005.
- Developmental testing, including factory and dockside testing, will continue through 2006.
- Operational evaluation, focusing on Tomahawk strike missions and SEAL operations, will occur in 2007.

SYSTEM DESCRIPTION AND MISSION

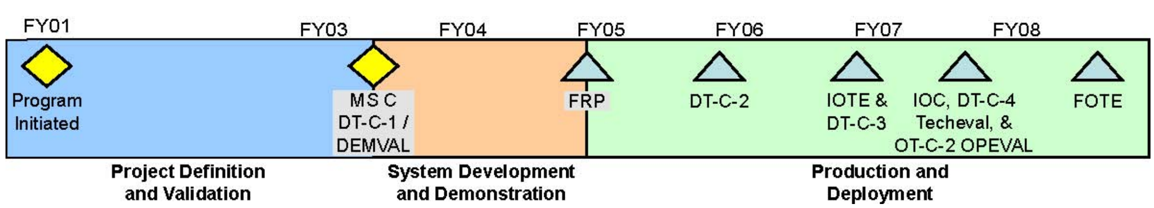
The Navy is reconfiguring four *Ohio* class nuclear ballistic missile submarines (SSBNs) as tactical platforms and retiring them from their strategic role. The *Ohio* class cruise missile submarine (SSGN) program entails the refueling and conversion of the four SSBNs to dedicated cruise missile submarines to support the Land-Attack/Strike mission. Each new multiple all-up-round canister (MAC) launcher contains seven Tomahawk Land-Attack Missiles (TLAMs) and fits within the existing Submarine Launched Ballistic Missile vertical launch tubes. Each SSGN will accommodate up to 22 MACs, for a total of 154 TLAMs.

The SSGN will also support Special Operations Forces missions. Two of the large vertical launch tubes will convert to Special Operations Forces lockout chambers and the ship will feature dedicated accommodations for Special Operations Forces personnel and their equipment. The SSGN is capable of hosting the Advanced SEAL Delivery System and Dry Deck Shelter on its upper deck.

In the future, the extensive payload capacity of the SSGN should be useful in supporting other off-board systems, including large unmanned and autonomous underwater vehicles, as well as alternate weapons systems.

The Navy plans to conduct operational evaluation of the SSGN's Strike and Special Operations Forces missions in FY07.

TEST AND EVALUATION ACTIVITY



The Navy approved the SSGN Operational Requirements Document in September 2002 and DOT&E approved the Test and Evaluation Master Plan in November 2002. The Test and Evaluation Master Plan is undergoing revisions to reflect recent schedule and program changes, and should be ready for signature in FY05.

The Navy conducted Demonstration and Validation testing of the MAC design in the Atlantic in January 2003. USS *Florida* conducted two TLAM firings using a non-production mock-up of the MAC. In addition, testers conducted land-based testing on MAC subsystems.

LFT&E activity in FY04 consisted of several program reviews that focused on defining the detailed LFT&E program and the scope of the Vulnerability Assessment Reports. The Navy goal is to maintain the level of survivability in the converted SSGN without introducing any survivability deficiencies into the platform.

TEST AND EVALUATION ASSESSMENT

During the Demonstration and Validation firings, USS *Florida* successfully launched two TLAMS that reached their targets. The launcher system employed a demonstration article (Demonstration and Validation MAC) which replicated the all-up-round spacing in a tactical production MAC, featuring two all-up-round missiles and an Inert Instrumented Test Vehicle. The program reported the witness round experienced some damage, and there were indications of post-launch debris and launch pressure transient problems. The program redesigned the all-up-round Capsule Closure Assembly to capture the launch debris caused by the Capsule Closure Assembly. This should enhance the adjacent missiles' survivability and minimize fouling the missile tube hatch during launch events.

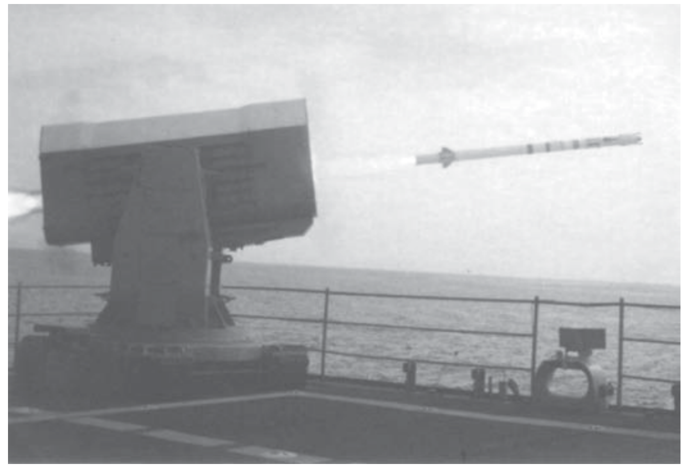
The Program Office believes land-based testing of the Capsule Closure Assembly redesign will replicate aspects of the SSGN environment and provide the capability for repeatability testing, lifecycle testing, and testing at environmental extremes. DOT&E believes that the Navy should schedule additional at-sea TLAM developmental test firings using the production MAC to adequately test the launch system. The MAC represents an entirely new launch system. Specifically, the MAC includes seven separate all-up-round TLAM canisters placed within a vertical tube with a single hatch. There are risks associated with the launch concept, including the effects of launch debris on the ship and associated systems, launch damage to adjacent all-up-rounds, and the effects of the SSGN's hydrodynamic flow field on the missiles. DOT&E supports the program's Demonstration and Validation plan as an important technical test and risk mitigation effort, but will require a full end-to-end test of the production-representative system at sea to satisfy operational test requirements. Ideally, a full salvo launch of TLAMs would occur, but cost and range safety restrictions limit the launch rate of real cruise missiles. The current Strike operational test plans include the launch of five TLAMs from a single MAC, spaced as closely as possible over the course of several days. While the consecutive firings may provide some indication of the cumulative stress on the system, the firing rate will be too slow to replicate a true salvo. DOT&E and the program office are evaluating the ability to safely fire two missiles in rapid succession during operational test and evaluation.

For both the Strike and Special Operations Forces mission operational tests, the conduct of realistic operations against a capable opposing force is essential. DOT&E emphasizes that the SSGN missions will involve new concepts of operations and take it into new environments, including the littorals. The SSGN must demonstrate the ability to execute its missions effectively while maintaining survivability. DOT&E is particularly interested in the shallow water, slow speed ship control, and the ability of the communications, sonar and combat systems to support the situational awareness to accomplish these new missions.

Rolling Airframe Missile (RAM) Weapon System

SUMMARY

- The operationally realistic environment provided by the Self Defense Test Ship produced Rolling Airframe Missile (RAM) Block 1A operational test and evaluation (OT&E) results that led to discovery and correction of software errors as well as understanding of Block 1A capability and limitations against current threats.



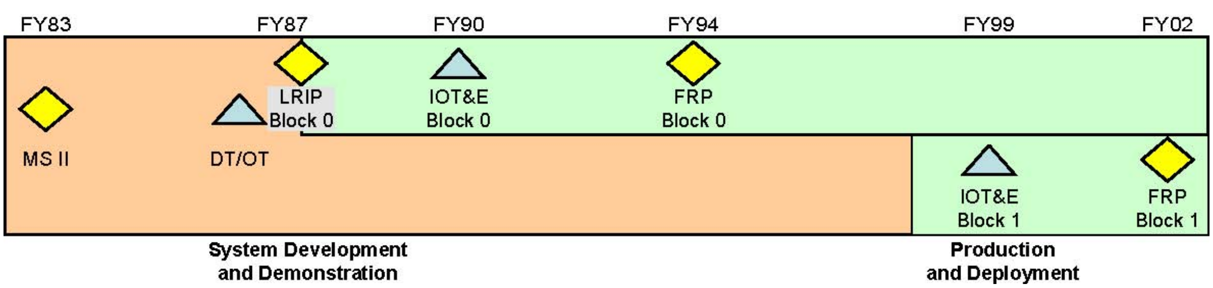
The RAM, jointly developed by the United States and the Federal Republic of Germany, provides surface ships with a low-cost, lightweight, self-defense system to defeat anti-ship cruise missiles.

SYSTEM DESCRIPTION AND MISSION

The RAM, jointly developed by the United States and the Federal Republic of Germany, provides surface ships with a low-cost, lightweight, self-defense system to defeat anti-ship cruise missiles (ASCMs). There are three RAM variants. RAM Block 0 uses dual mode, passive radio frequency/infrared guidance. RAM Block 0 Initial OT&E (IOT&E) completed in FY90. RAM Block 0 enhances ship self defense against several radio frequency-radiating ASCMs, while RAM Block 1 extends that defense against non-radio frequency radiating missiles. The RAM Block 1 operational evaluation in 1999 used the Self Defense Test Ship and the USS *Gunston Hall*. RAM Block 1A extends the capability of RAM Block 1 against non-ASCM targets, including helicopters, slow aircraft, and surface threats (HAS).

A variety of combat systems use the RAM weapon system. The AN/SWY-2 and -3 combat systems account for most RAM weapon system installations. AN/SWY-2 installations use RAM as the only hard-kill weapon. AN/SWY-3 installations use both RAM and NATO Seasparrow systems as hard-kill weapons. RAM integration with the Ship Self Defense System Mark 1 provides self defense on the LSD 41/49-class of amphibious ships. RAM, integrated with the Ship Self Defense System Mark 2 on LPD 17-class, LHD 1-class, and CVN 68-class ships provides short-range self defense (the NATO Seasparrow is also on the latter two ship classes). HAS integration into combat systems is not funded at this time.

TEST AND EVALUATION ACTIVITY



Combined developmental test/operational test of RAM Block 1 extended into FY04 with a follow-on phase using the Self Defense Test Ship. In addition to carrying out deferred testing from the FY99 operational evaluation, these operationally realistic tests determined that RAM, with the new HAS software, retained capability against ASCMs. Developmental tests in FY04 also examined RAM capabilities against HAS targets using a fixed launcher on San Nicolas Island at the Point Mugu, California, sea range.

TEST AND EVALUATION ASSESSMENT

RAM Block 1, as supported by an LSD 41-class combat system, is operationally effective against most current ASCMs. RAM Block 1 is operationally suitable and is lethal against most current ASCMs. Follow-on Test and Evaluation for Block 1 (or Block 1A) still needs to address missile capability against the threat category that was not tested during the operational evaluation, against ASCMs under conditions of electronic jamming of the combat system sensors, in low visibility (high aerosol) environments, and in the presence of other infrared sources. For the threat category not tested during the operational evaluation, the Navy's subsonic target upgrade program may deliver targets by FY06 that are adequately representative of the threat for some acquisition programs. The Navy's target developers did not accord high priority to providing the characteristics required to make the target adequately threat representative for RAM program testing. Overall combat testing, using RAM as a weapon, will not be adequate without testing against ASCMs under conditions of electronic countermeasures against the combat system sensors. Until such testing is accomplished, the fleet users of the system will remain uninformed about their self-defense capability in that environment.

RAM HAS Capability. The program sponsor has yet to issue detailed performance goals for RAM HAS. From an OT&E perspective, the absence of operational requirements undermines objective assessment of operational test results and hampers the program manager's ability to understand the impact of performance trades on mission accomplishment and operational effectiveness against HAS targets. In addition to the combined developmental test/operational test against ASCMs on the Self Defense Test Ship in FY03/FY04, developmental tests included RAM (with Block 1A flight software) fired from a fixed launcher to successfully intercept a coastal patrol boat and destroy two helicopter targets.

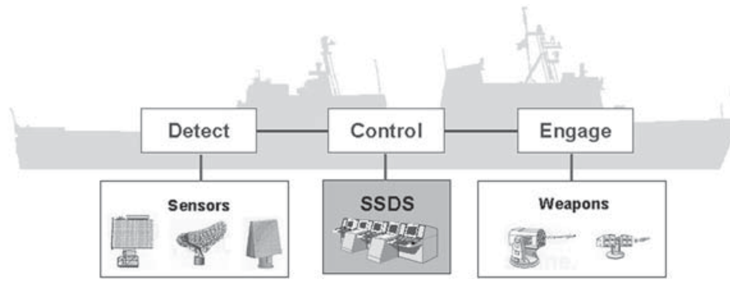
The combined developmental test/operational test against ASCMs ended with two stressing scenarios in November 2004. Results of this combined developmental test/operational test reaffirmed the value of operationally realistic testing conducted with the Self Defense Test Ship. Problems with Ship Self Defense System Mark 1 and with the RAM HAS software discovered during these realistic tests against ASCMs could not have been discovered in testing with a manned ship.

The LFT&E strategy for RAM HAS includes ground testing of the warhead against whole targets and/or components, flight-testing, and simulation based analyses. There is little data on RAM warhead lethality against the new target set and for the development of simulations used to predict lethality/effectiveness under a variety of scenarios. During RAM Block 0 and Block 1, LFT&E only evaluated lethality against various ASCMs.

Ship Self Defense System (SSDS)

SUMMARY

- FY04 testing demonstrated that the Ship Self Defense System (SSDS) Mark 2 enhances ship performance; however, operators were at times unable to maintain situational awareness due to issues with track management, system design, reliability, and human factors. In some cases, SSDS performance regressed with each new software build. If this is unresolved before USS *Ronald Reagan* (CVN 76) deploys, this could hinder self defense capability.
- Implementation and testing of SSDS interfaces with Global Command and Control-Maritime and TPX-42A(V) remain deferred and unfunded, placing a greater burden on operators and potentially contributing to blue-on-blue engagements.
- Future operational test and evaluation (OT&E) of SSDS Mark 2 Mod 3 for LHD 8/LHA(R) requires a phase on the Self Defense Test Ship (SDTS).
- Future OT&E of SSDS Mark 2 Mod 1 for Evolved Seasparrow Missile integration requires a phase on the SDTS.



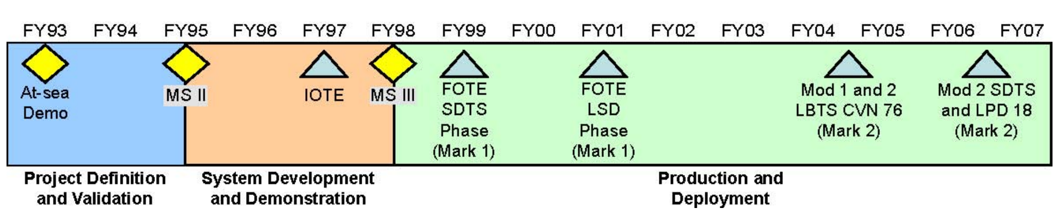
SSDS Mark 1 provides an automated and integrated detect-to-engage capability against anti-ship cruise missiles.

SYSTEM DESCRIPTION AND MISSION

The SSDS consists of two versions: Mark 1 – fielded in LSD 41/49-class ships, and Mark 2 – in development for CV/CVN class aircraft carriers, LPD 17 class amphibious ships, LHD class ships and LHA-replacement ships. SSDS Mark 1 provides an automated and integrated detect-to-engage capability against anti-ship cruise missiles. Mark 2 adds the command and decision functionality of the Advanced Combat Direction System Block 1. Mark 2 provides command and control capability and combat direction capability across the air, surface, undersea, strike, and command, control, and communications warfare areas. SSDS Mark 2 interfaces with the Cooperative Engagement Capability, thereby leveraging the tracking and sensor integration capabilities of the Cooperative Engagement Capability system.

SSDS Mark 2 has four variants. Mod 0 is a one-of-a-kind system installed on USS *Nimitz* (CVN 68). The other 11 aircraft carriers will use the Mod 1 system, fielded on USS *Ronald Reagan*. Mod 2 is for all LPD 17 class ships, beginning with *San Antonio* (LPD 17). LHD 1-class and LHA(R)-class ships will have Mod 3. The major differences in the Mods are in the sensors, weapons, and their integration for the different ship classes. With Mod 3B, SSDS will migrate to an open architecture system.

TEST AND EVALUATION ACTIVITY



In FY04, the SSDS program completed two land-based developmental tests of the Mod 1 system at the Ship Combat Systems Center, Wallops Island, Virginia, and concluded the Mod 1 land-based test phase. The Navy operational test agency conducted an operational assessment of readiness for OT&E, based on the last Mod 1 land-based test. Two Mod 1 developmental tests on CVN 76 and the first Mod 2 developmental land-based test are complete.

In July 2004, DOT&E approved the revised Mark 2 Test and Evaluation Master Plan (TEMP) for all Mark 2 Mod 1 CVN 76 test and evaluation phases, all Mark 2 Mod 2 LPD 17 developmental test and evaluation, and operational test and evaluation through the land-based test phase. As a condition of approval, the Navy must update the TEMP before Mark 2 Mod 2 LPD 17 OT&E, and resubmit it for Office of the Secretary of Defense approval. This update must address OT&E after Evolved Seasparrow Missile integration, open architecture implementation, Mod 3 development, and Threat D target availability.

TEST AND EVALUATION ASSESSMENT

During the past fiscal year, the schedule for SSDS Mark 2 Mod 1 OT&E shifted from 1QFY05 to 3QFY05. As outlined in the TEMP approved in FY04, OT&E for Mod 1 will consist of anti-ship cruise missile target tracking exercises, but no missile firings. Instead, the Navy will use missile firings during the CVN 76 Combat System Ship Qualification Trials/ developmental test period in 2QFY05 to resolve OT&E critical operational issues. Although the SSDS program office intends to conduct the events under operationally realistic conditions, DOT&E stresses the importance of doing so in order to resolve the Critical Operational Issues fully before CVN 76 deployment.

Land- and sea-based developmental tests of the Mod 1 system in FY04 had mixed results. The tests demonstrated SSDS significantly enhances force command and control and own-ship self-defense, albeit against non-stressing targets. However, operators were at times unable to maintain situational awareness because of issues with track management, system design, reliability, and human factors. In some cases, SSDS performance in these areas regressed with each new software build under test. Although the SSDS program intends to address the higher priority problem areas in time to support OT&E, there are few opportunities remaining to test the fixes aboard CVN 76. For lower priority problems, fixes may not be in place before CVN 76 deployment because of the large number of issues remaining. Such large numbers could lead to workarounds, deferrals, and protracted build plans, and if unresolved before CVN 76 deploys, could hinder self defense capability.

In FY04, the Navy made no progress toward funding deferred SSDS Mark 2 interfaces that are critical to the ability of Mod 1 and Mod 2 ships to perform their missions. The original intent was to develop SSDS interfaces to important command and control systems, specifically Global Command and Control System-Maritime and the TPX-42A(V), but the program deferred development indefinitely due to a lack of funding. Without the interfaces, operators must manually fuse the air and surface pictures displayed on the SSDS console with the blue force pictures on the separate Global Command and Control System-Maritime and TPX-42A(V) consoles. This could severely impact how SSDS provides command and control for battle force operations and could increase the likelihood of blue-on-blue engagements.

Since the SSDS Mark 2 ships use short-range weapons, safe and effective OT&E requires the SDTS capability of remote operation during operationally realistic self defense scenarios. The SSDS TEMP partially addresses this concern with the addition of an SDTS test phase within the FY06/FY07 LPD 17 OT&E window. Future OT&E of the Mod 3 combat system in the LHD 8/LHA(R) Flight 0 configuration will require the SDTS, as will that for the Mod 1 combat system, when it is integrated with Evolved Seasparrow Missile.

SSN 774 *Virginia* Class

SUMMARY

- The *Virginia* SSN completed the initial builder's and acoustic trials in August 2004, where both the crew and the ship performed well.
- Commissioning and ship delivery occurred in October 2004.
- DOT&E approved the updated *Virginia* SSN Test and Evaluation Plan in June 2004.
- The Program Executive Officer of Submarines requested a revision to the Live Fire Test and Evaluation (LFT&E) Plan and the Test and Evaluation Master Plan that would cancel the Full Ship Shock Trials.
- The Navy scheduled the operational evaluation for USS *Virginia* in FY08.

Virginia *class submarines will replace the aging fleet of* Los Angeles *(SSN 688) class submarines.*

SYSTEM DESCRIPTION AND MISSION

Virginia class submarines will replace the aging fleet of *Los Angeles* (SSN 688) class submarines. The Navy intends the *Virginia* class to be a submarine comparable in most respects to its immediate predecessor - the *Seawolf* - but in a more affordable configuration. The missions of *Virginia* include Covert Strike Warfare, Anti-Submarine Warfare, Covert Intelligence Collection/Surveillance, Covert Indication and Warning and Electronic Warfare, Anti-Surface Ship Warfare, Special Warfare, Covert Mine Warfare, and Battle Group Support.

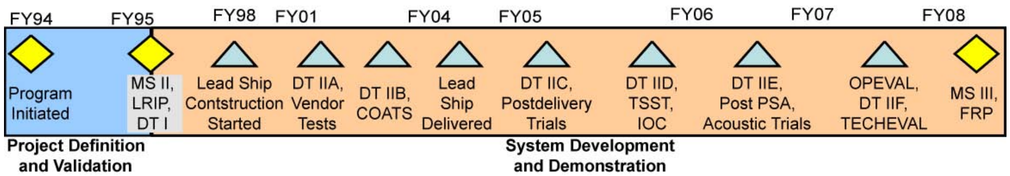
Virginia will be capable of targeting, controlling, and launching Mark 48 Advanced Capability Torpedoes, mines, and Tomahawk missiles. Its sonar capability is expected to be similar to *Seawolf*'s, and its electronic support suite and combat control system is an improvement over legacy systems. The Navy is designing its external communications system to provide full, high data rate interoperability with U.S. and allied forces. These communications capabilities support *Virginia*'s intelligence collection and strike capabilities.

The Navy has integrated the SSN 774 submarine Non-Propulsion Electronics System outside of the ship's hull. Sonar displays and processors; Navigation and Combat Control Architecture; Data Distribution and Display and Electronic Support Measures, Onboard Team Trainer; Total Ship Monitoring; and Submarine Regional Warfare systems were all integrated electronically on a rafted system and inserted into the *Virginia* hull.

DOT&E recommended, and the Secretary of Defense approved, a waiver from full-up, system-level live fire testing of *Virginia* in accordance with Title 10, Section 2366. DOT&E approved the alternative LFT&E plan in June 1995. This plan includes shock qualification tests and analysis of components, surrogate underwater shock tests, a total Ship Survivability Trial, a Full-Ship Shock Trial, as well as a series of vulnerability assessments. In September 2004, the Program Executive Officer requested deleting the underwater shock trials.

The Navy commissioned the USS *Virginia* in Norfolk, Virginia, on October 23, 2004.

TEST AND EVALUATION ACTIVITY



The Navy and construction shipyards launched, christened, conducted dockside testing, and completed the builder's initial sea and acoustic trials on *Virginia* in 2004. To allow the ship to depart the shipyard and to test ship systems, the Navy postponed some construction items necessary for full ship's capability, but not affecting safe operations or self-defense capabilities. The Navy and shipyard completed the builder's trials successfully with minor system and ship deficiencies.

TEST AND EVALUATION ASSESSMENT

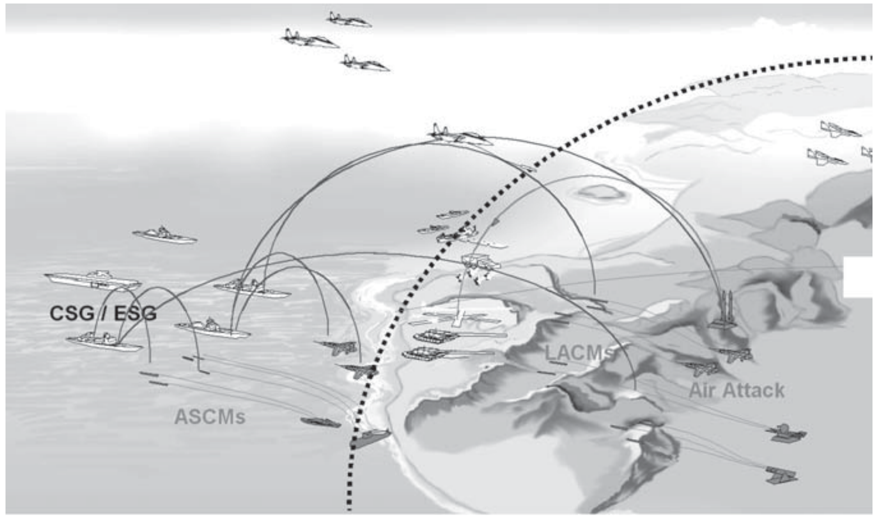
The Navy reported the *Virginia* performed well during the builder's sea trials. Reported problem areas appear to be minor in nature.

The *Virginia's* Non-propulsion Electronic Systems adequately supported the at-sea trial and test operations. This is a credit to the extensive testing at the shipbuilder and the land based test site over the last two years. However, much of the systems capabilities have yet to be fully tested at sea. The Navy plans to upgrade the Non-propulsion Electronic Systems during the *Virginia's* post-shipyard availability in 2006 and continue the upgrades during the modernization period in 2007. These upgrades will provide the configuration needed for operational evaluation in 2008. Currently, functionality for Acoustic Intelligence, Special Operations Support, and the Circuit D–active degaussing have not been tested, while problems are being resolved with the Light Weight Wide Aperture Array, the Photonics mast, the Submarine Regional Warfare System, and the Deployable Array Working Group. Other installs, such as the Common Submarine Radio Room and the operational evaluation version of Acoustic Rapid Commercial Off-the-shelf Insertion Sonar System, are part of the post shipyard availability modernization.

The Operation Test and Evaluation Force reported concerns regarding the linked issues of habitability, access, and damage control in the last two operational assessments. The most detrimental impact of poor habitability is on the damage control response to a major casualty, such as fire or flooding. Access to spaces outboard the berthing areas are extremely limited. These outboard spaces contain many high-pressure air and hydraulic lines, as well as electrical cables and water piping. Additionally, small passageways and lack of space in berthing areas limit the ability of the crew to evacuate from, and respond to, casualties from these crowded spaces. The program has improved access to these areas by installing removable panels for damage control access and widening or modifying the access doors. These changes will be evaluated during at-sea operations and during the operational evaluation.

The Navy chose the Voyage Management System as the new program to provide paperless navigation capability to *Virginia*. The initiative to integrate Voyage Manager System in *Virginia* does not support installation and testing of a paperless charting system until 2006. Consequently, *Virginia* conducted all operations using paper charts and temporary plotting tables.

Standard Missile-6 (SM-6) Extended Range Active Missile



SM-6 will support theater air defense for sea and littoral forces by engaging air threats such as land attack cruise missiles in the high-clutter over-land environment.

SUMMARY

- Standard Missile-6 (SM-6) at-sea testing requires that the Pacific Missile Range have capabilities to launch and control the numbers of targets needed for the operational evaluation scenarios. The operational evaluation also requires Pacific Missile Range instrumentation upgrading to handle the number of in-flight missiles planned.
- At-sea testing requires realistic surrogates to determine SM-6 capability against emerging cruise missile threats. These aerial target requirements include a surrogate for Threat D. The Navy currently does not have a credible Threat D target.

SYSTEM DESCRIPTION AND MISSION

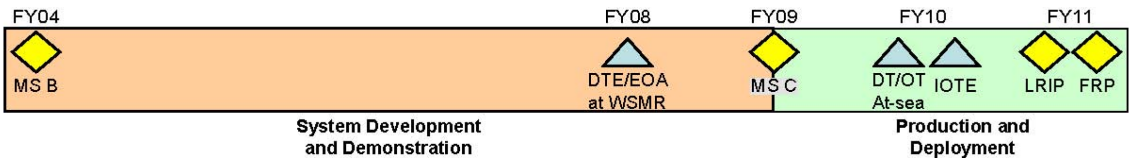
SM-6 Extended Range Active Missile is a surface-to-air supersonic missile launched from Aegis destroyers and cruisers. SM-6 is in development to complement the medium- and short-range members of the Standard Missile family (SM-2) in the ship self-defense and area-defense missions. SM-6 Extended Range Active Missile will permit attrition of aircraft and anti-ship cruise missile raids at long range. SM-6 will support theater air defense for sea and littoral forces by engaging air threats such as land attack cruise missiles in the high-clutter over-land environment. Current SM-2s have virtually no capability to engage low-flying threats over land.

SM-6 introduces an active seeker capability into the SM-2 Block IV extended range missile design (before program termination, the Navy ordered less than 160 low-rate initial production Block IVs). The SM-6 design incorporates a repackaged Advanced Medium Range Air-to-Air Missile active seeker and a larger diameter antenna than used by the Advanced Medium Range Air-to-Air Missile. The SM-6 airframe, propulsion system, and warhead are the same as for Block IV.

SM-6 Block I will initially deploy in 2010. SM-6 capability in 2010 includes area air defense; extended range anti-air warfare; engage-on-remote in which a ship, using fire control data from another ship, can fire at a target for which is does not have local track; and over-the-horizon engagements if the missile acquires the target before it drops below the ship's radar horizon. Upgrades will lead to SM-2 Block II with the ability to conduct over-the-horizon engagements and forward pass engagements in which SM-6 control is passed from the firing ship to another platform. Over-the-horizon capability, available around 2014, requires Aegis software baseline upgrades and an elevated sensor under development for the E-2C program. Forward pass capability, available around 2020, first requires definition and development of a Joint architecture.

The Milestone B review occurred in June 2004, followed by approval for SM-6 program entry into the System Development and Demonstration phase.

TEST AND EVALUATION ACTIVITY



DOT&E approved the SM-6 Test and Evaluation Master Plan (TEMP) in June 2004. The TEMP includes a scenario matrix for operational evaluation agreed upon by the program office, the Navy's Operational Test and Evaluation Force, and DOT&E. This matrix includes firings against supersonic and subsonic drones representing cruise missile threats, manned and unmanned aircraft surrogates, and will test weapon system interoperability. The TEMP fully integrates live fire test and evaluation with developmental and operational testing.

TEST AND EVALUATION ASSESSMENT

Planned test and evaluation include both land-based testing at the White Sands Missile Range in FY07-FY08, and sea-based testing at the Pacific Missile Range, Hawaii, in FY10. One of DOT&E's key concerns for operational evaluation is the need to upgrade the range facilities and instrumentation to accommodate the numbers of targets and missiles needed to stage the operational evaluation scenarios. The program office intends to form a Range Upgrade Working Group to ensure that these upgrades take place. Another key concern is the capability to evaluate the effectiveness of SM-6 against Threat D. The Acquisition Decision Memorandum from the Milestone B review identified the requirement to form a Threat D Target Working Group to explore target availability and target options.

Strategic Sealift Program (SSP)

SSP ships can provide a surge transport capability, or be filled with combat equipment and pre-positioned for a projected military force.

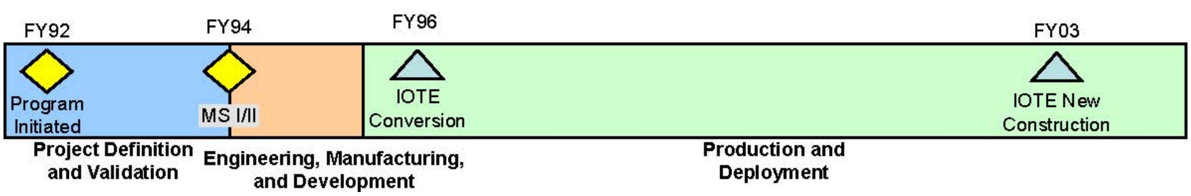
SUMMARY

- DOT&E issued a beyond low-rate initial production report in July 2004, evaluating the Strategic Sealift Program (SSP) ships operationally effective and operationally suitable.
- Production and testing of the SSP ships is complete.

SYSTEM DESCRIPTION AND MISSION

The SSP consists of nineteen large, medium-speed roll-on/roll-off ships in four different designs. Construction and delivery of all ships is complete. The ships can provide a surge transport capability, or be filled with combat equipment and pre-positioned for a projected military force. They are about 950 feet long and 106 feet wide (to enable transit through the Panama Canal), and displace about 59,000 long tons. Their top speed is 24 knots and they have a 12,000 nm range without refueling. They can conduct self-sustained roll-on/roll-off and lift-on/lift-off operations at a pier or at anchorage. SSP ships are not armed and do not have a combat system, but they do have a command, control, communications, and intelligence suite sufficient to perform their mission.

TEST AND EVALUATION ACTIVITY



The SSP completed its operational evaluation in FY03. Actual operational data from FY04 verified the correction of outstanding deficiencies from the operational testing. The Military Sealift Command used these ships extensively for transport of Army equipment to support Operations Enduring Freedom and Iraqi Freedom. Of the 7.31 million square feet of cargo moved by surge sealift during these operations, SSP ships moved 5.3 million square feet (72 percent). The performance of the ships in these actual operations provides additional support for the conclusions as to their effectiveness and suitability.

TEST AND EVALUATION ASSESSMENT

The ships are operationally effective and operationally suitable. Although SSP ships are required to support cargo operations at anchor in Sea State 3, there is no plan to test this capability because there is no cargo lighterage system, existing or planned, that can safely accept cargo transfer above Sea State 2.

Surface Electronic Warfare Improvement Program (SEWIP)

SUMMARY

- The Surface Electronic Warfare Improvement Program (SEWIP) conducted an operational assessment of its first development increment during FY04. The testing indicated that the new digital processing unit performed well, with detection and classification probabilities that were above the requirements.
- Approval occurred in October 2004 of the SEWIP Test and Evaluation Master Plan's (TEMP) adequacy to evaluate Block 1A of this evolutionary development program.
- The program office intends to begin testing Block 1B in FY05, but both the Capability Development Document and the TEMP for Block 1B remain unapproved.

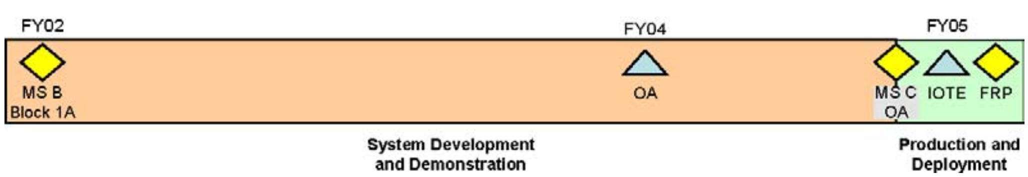
SEWIP is an Acquisition Category II development established to provide much needed logistic and capability improvements to the Navy's AN/SLQ-32 equipment installed on all surface warships.

SYSTEM DESCRIPTION AND MISSION

SEWIP is an Acquisition Category II development established to provide much needed logistic and capability improvements to the Navy's AN/SLQ-32 equipment installed on all surface warships. Small ships have only a basic passive intercept capability, and the installation on larger ships includes a self-protection jamming capability. SLQ-32 achieved initial operational capability in 1972 and received numerous upgrades over the years, but now some replacement parts are unavailable. The Advanced Integrated Electronic Warfare program, intended to replace SLQ-32, terminated in April 2002 in response to cost and schedule deficiencies.

SEWIP is an evolutionary acquisition program to provide electronic warfare improvements in three block upgrades, although Block 1 has three sub-block increments. Block 1A replaces the obsolete digital processing and tracking modules for all ships except aircraft carriers. It also provides substantially improved operator human-machine integration for amphibious ships (LSD and LPD), destroyers (most DDGs), frigates (FFG), and fleet flagships (AGF and LCC). Block 1B adds situational awareness improvements and some classified enhancements, and Block 1C extends the Block 1A improvements to all ships with SLQ-32. Block 2 replaces the receiver and antenna with significantly improved equipment (and is a candidate for installation in DD(X)), and upgrades self-protection jamming for the ships with jamming capability. Block 3 further improves jamming capability. Milestone B dates for Blocks 2 and 3 remain to be determined.

TEST AND EVALUATION ACTIVITY



The first operational assessment of the Block 1A development was conducted at sea in the Navy's Virginia Capes Operating Areas in May 2004. This operational assessment examined the capabilities of the Electronic Surveillance Enhancement that replaces the obsolete digital processing and tracking modules in the SLQ-32. Electronic Surveillance

Enhancement testing occurred in May 2004 with the new modules installed in an Aegis destroyer operating in the Virginia Capes fleet operating areas. The ship tracked simulated attacking missiles and aircraft, as well as various targets of opportunity. A second operational assessment to examine capability of the improved operator interface encountered delays that moved it into FY05.

TEST AND EVALUATION ASSESSMENT

Testing for the operational assessment consisted of scenarios stressing situational awareness, as well as some to evaluate support to missile engagements. These scenarios were not as realistic or as stressing as those to be presented in final testing of Block 1A, but the testing indicated that the new digital processing unit performed well, with detection and classification probabilities that were above the requirements. The time on test was not sufficient to thoroughly verify reliability performance, and maintenance testing was hampered by inadequately identified system components.

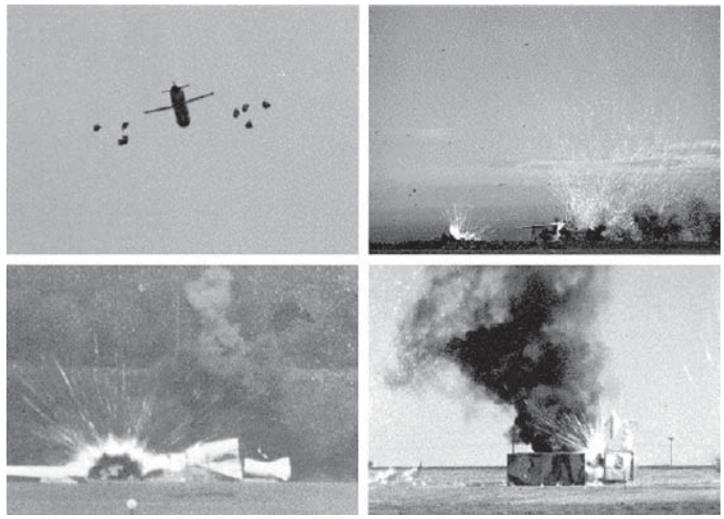
Planning for the initial operational test and evaluation, called operational evaluation by the Navy, of SEWIP Block 1A is in progress. Initial indications are that the test will be adequate to determine the operational effectiveness and suitability. Some difficulties may result from schedule perturbations involving the test ship. Completion of arrangements to provide a drone target for realistic simulation of an attacking cruise missile is required.

The TEMP for SEWIP covers only Block 1A. Although the program schedule indicates that Block 1B began development and integration in FY03 and is planning to begin government test and evaluation in FY05, there is no approved TEMP for that testing or for Block 1C.

Tactical Tomahawk Weapon System (TTWS)

SUMMARY

- The Tactical Tomahawk Weapon System (TTWS) is operationally effective and operationally suitable if operated with Block III tactics and procedures, with missions flown by either Block III or Block IV missiles, including launch platform mission planning missions.
- The system demonstrated that it is lethal.
- TTWS needs improvements in the areas of communications bandwidth, operator training, and system documentation in order to reach its full potential.



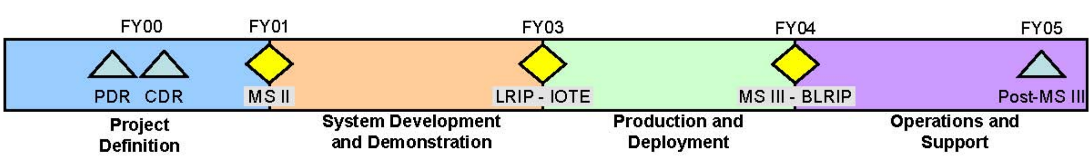
TTWS follow-on operational test and evaluation is expected to begin in FY05.

SYSTEM DESCRIPTION AND MISSION

Tomahawk is a long-range cruise missile designed to be launched from submarines and surface ships against land targets. Engagement planning, missile initialization, and launch control functions are performed aboard the launch platform by a Combat Control System (submarines) or Tomahawk Weapon Control System (surface ships). Targeting, mission planning, and distribution of Tomahawk tactical data are provided by the Tomahawk Command and Control System (TC2S). There are currently two versions of Tomahawk: Tomahawk Baseline III and Tactical Tomahawk Baseline IV.

- **Tomahawk Baseline III.** Three primary variants of Tomahawk Baseline III are currently operational: RGM-109A Tomahawk Land Attack Nuclear (TLAM-N) (not deployed); RGM-109C Tomahawk Land Attack Missile-conventional (TLAM-C); and RGM-109D Tomahawk Land Attack Missile-conventional submunition (TLAM-D). The fielded Baseline III Tomahawk Weapon System continues to receive incremental upgrades. The principal improvements are in the Advanced Tomahawk Weapon Control System (ATWCS) fire-control system and the TC2S.
- **Tactical Tomahawk Baseline IV.** The RGM-109E Tactical Tomahawk program began in FY98 as a restructure of the earlier Tomahawk Baseline Improvement Program (FY94-98). Tactical Tomahawk represents a considerable leap forward in technology. Designated Command, Control, and Communications (C3) nodes will be able to communicate with the missile in flight and direct it to pre-planned alternate targets, or change its mission plan to attack new targets. While in flight, the missile will be able to transmit its health, status, and limited imagery to the C3 nodes. The fire control system is also being upgraded and is called the Tactical Tomahawk Weapon Control System (TTWCS). The Tactical Tomahawk retains the same WDU-36/B warhead as the Tomahawk Block III.

TEST AND EVALUATION ACTIVITY



- **Tomahawk Baseline III.** The lead operational test agency, the Navy's Operational Test and Evaluation Force, completed two operational test (OT) phases in FY04. The TC2S software release TMPC/APS 3.4 was tested during OT-IIIH. The Navy completed OT-IIIZ, evaluating ATWCS software release 1.7.2.1, in FY04. The improvements ensure compatibility with existing and future Naval and Joint C3I systems.
- **Tomahawk Baseline IV.** The Navy completed test event OT-IIB, evaluating the Phase 1A Tactical Tomahawk (TTWCS backward compatibility with Block III missiles and TC2S), in FY04. Test events included two 48-hour at-sea battle group scenarios in which TTWCS received tasking and intelligence inputs; performed mission planning, engagement planning, and C3 functions; and launched simulated missiles, including salvo launches. Other test events included two Block III All-Up-Round test flights, a maintenance demonstration, and supplementary battle force simulation exercises at the Naval Surface Warfare Center.

  Test event OT-IIC, a system-level operational evaluation for Tactical Tomahawk Baseline IV, took place in FY04. Testing began with two week-long at-sea battle group scenarios in which TTWCS received tasking and intelligence inputs; performed mission planning, engagement planning, and C3 functions; launched simulated missiles, including salvo launches; and conducted post-launch communications with simulated missiles. Actual Block IV All-Up-Round launches were conducted from both surface and submarine platforms, with post-launch two-way communications being demonstrated. Laboratory testing using high-fidelity missile flight simulations supplemented flight testing and scenario testing. The Navy tested mission planning functions extensively, with surface and submarine launch platforms each creating 30 missions, and shore facilities creating 30 more.

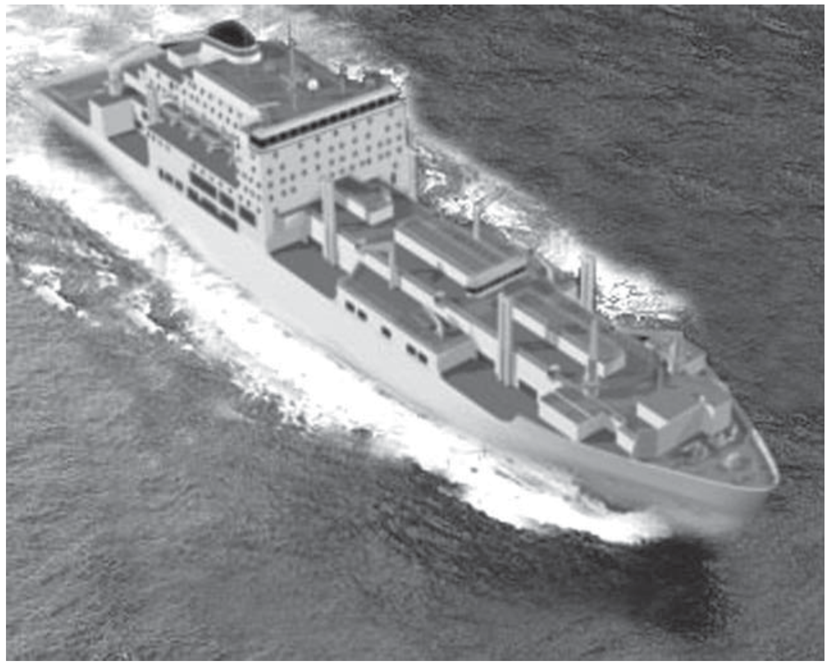
TEST AND EVALUATION ASSESSMENT

- **Tomahawk Baseline III.** The testing conducted during phase OT-IIIH resulted in findings that TC2S software version TMPC/APS 3.4 is operationally effective and operationally suitable. All Critical Operational Issues were resolved as "satisfactory" and fleet introduction of TC2S software was recommended. The OT-IIIZ resulted in findings that ATWCS software release 1.7.2.1 is operationally effective and operationally suitable.
- **Tomahawk Baseline IV.** The testing conducted during phase OT-IIB resulted in findings that Phase 1A Tactical Tomahawk (TTWCS backward compatibility with Block III missiles and TC2S) is operationally effective and operationally suitable. With one exception, all Critical Operational Issues were resolved as "satisfactory." Fleet introduction of Phase 1A Tactical Tomahawk was recommended, together with rapid resolution of remaining deficiencies and verification of their corrections.

The testing conducted during phase OT-IIC resulted in findings that the Baseline IV TTWS is operationally effective and operationally suitable if limited to execution of existing Block III tactics and procedures using the Block III or Block IV missile. The TTWS was found not operationally effective and not operationally suitable to execute the full array of Block IV post-launch activity. TTWS needs improvements in the areas of communications bandwidth, operator training, and system documentation in order to reach its full potential. The Navy recommended fleet introduction of the TTWS, with the proviso that tactics and procedures be limited as discussed above, and that the necessary improvements be developed, implemented, and verified through follow-on testing as quickly as possible.

DOT&E submitted the beyond low-rate initial production report for Tactical Tomahawk on July 13, 2004. DOT&E found that TTWS testing was adequate to determine operational effectiveness, operational suitability, and lethality; that the TTWS is operationally effective, operationally suitable, and lethal; and that the TTWS should not be employed with post-launch C3 and tasking until the deficiencies identified in the testing have been corrected and verified through follow-on operational test and evaluation. TTWS follow-on operational test and evaluation is expected to begin in FY05.

T-AKE 1 Class Dry Cargo/Ammunition Ship



The T-AKE will primarily function as a shuttle ship, ferrying cargo and ammunition between port and a larger, consolidating replenishment ship.

SUMMARY

- The lead ship is under construction. In addition to the lead ship, the Navy awarded contracts for five of ten planned follow-on ships.
- Navy operational testers completed an operational assessment (OT-IIA) of T-AKE 1 in December 2002.
- A second operational assessment (OT-IIB) started in June 2004 and will finish in March 2005. It will re-examine deficiencies from OT-IIA, as well as several new areas.

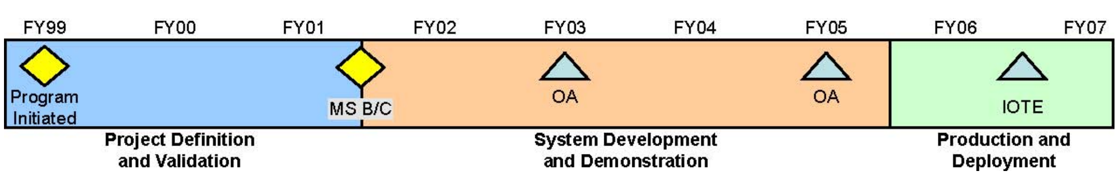
SYSTEM DESCRIPTION AND MISSION

The T-AKE Class Dry Cargo/Ammunition Ship will supply Navy combat forces at sea with ordnance and provisions. It will primarily function as a shuttle ship, ferrying cargo and ammunition between port and a larger, consolidating replenishment ship, known as a station ship, which stays with the strike group. As a secondary function, T-AKE will be capable of operating as a station ship when accompanied by an oiler.

T-AKE will re-supply customer ships by connected and vertical replenishment and will have a limited capacity to refuel ships. Civilian mariners of the Military Sealift Command or U.S. Merchant Marine will operate the ships. The Navy is constructing the ships to commercial standards with some additional survivability features and passive defense capabilities. They will have the Advanced Degaussing System to protect against mines and the AN/SLQ-25 (NIXIE) torpedo counter-measure system. T-AKE will require a combatant ship escort to protect it from threats when in a hostile environment.

In October 2001, the Navy awarded the contract for detailed design and construction of the lead ship. Ship construction is behind schedule, but still within the allotted timeframe. The Navy has contracted for six ships so far, and plans to buy 11 total. Construction of T-AKE 1 began in September 2003. Scheduled delivery is January 2006.

TEST AND EVALUATION ACTIVITY



The Navy's operational testers completed the first operational assessment (OT-IIA) of T-AKE in December 2002. This assessment examined the potential of ship design to achieve required performance levels.

OT-IIB started in June 2004 and will continue through March 2005. It will re-examine deficiencies identified during OT-IIA and review all twenty-one critical operational issues. Subject matter experts will review documents, specifications, drawings, certifications, demonstrations, and modeling and simulation.

The Navy is studying the ability of a combatant escort to provide protection to large, unarmed ships like T-AKE. This report is due out in March 2005.

TEST AND EVALUATION ASSESSMENT

Based on the initial operational assessment, the T-AKE design is sound and we expect it to be able to perform its mission. However, we are concerned about the system being developed to track the onload, offload, and storage of ammunition and cargo. The Navy originally planned for the Shipboard Warehouse Management System to be an off-the-shelf hardware and software system, but it has required much more modification than expected. One of the significant challenges it faces is interfacing with both classified and unclassified data management systems. There is no land based test site or pilot installation planned, so the management system will not be available for Navy operational testers to evaluate prior to installation on the first ship.

Although cargo holds appear sufficiently designed to withstand a credible ballistic event, test results were unexpected and didn't match modeling and simulation predictions. Overall, the Navy's Detailed Design Vulnerability Assessment Report and surrogate testing are behind schedule.

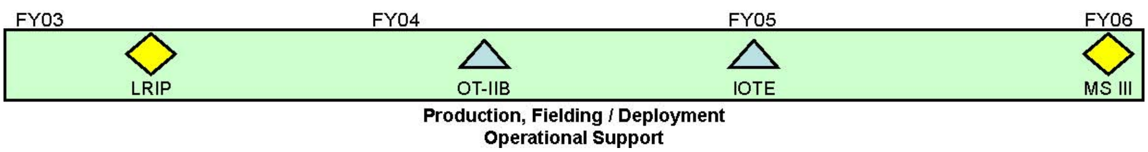
USMC H1 Upgrades

SYSTEM DESCRIPTION AND MISSION

This program combines upgrades of two USMC H-1 aircraft: the AH-1W Cobra attack helicopter and the UH-1N light utility helicopter. The common elements of the two will be identical twin engines, drive trains, a new four-bladed rotor, tail sections, and integrated digital cockpits. In addition, the AH-1Z attack helicopter will feature an upgraded targeting system while the UH-1Y will double the payload and range of legacy utility aircraft.

In the past year, the H-1 Upgrades System Development and Demonstration aircraft have matured markedly.

TEST AND EVALUATION ACTIVITY



The approved Test and Evaluation Master Plan calls for the test and evaluation program to be conducted in two phases: integrated contractor/government developmental testing and operational testing. Both the AH-1Z and UH-1Y will participate in Operational Test and Evaluation (OT&E) and Live Fire Test and Evaluation (LFT&E).

In the past year, the second of two planned operational assessments, OT-IIB, was conducted at Naval Air Station Patuxent River, Maryland, in April and May 2004. Operational test pilots completed 120.3 flight hours and 44 operational missions while fleet Marines performed operational-level maintenance on two H-1 Upgrades aircraft. The Navy will consider results from OT-IIB in making a second low-rate initial production decision to produce three AH-1Z and six UH-1Y aircraft.

Following OT-IIB, more developmental testing of the UH-1Y was conducted at Camp A.P. Hill, Virginia, and the AH-1Z at Yuma, Arizona. Marine maintainers continued to assist with aircraft maintenance and validation of maintenance documents and procedures. At year’s end, the aircraft received planned modifications to software and hardware that address many of the previously discovered deficiencies and provide all remaining production functionality for the operational evaluation aircraft. Operational evaluation will support the full-rate production decision in FY06.

Live Fire testing continued in accordance with the approved LFT&E strategy. The Live Fire program has completed sixteen of twenty-one planned tests, including a dynamic test of the main rotor gearbox, rotating with partial load. These tests require operating targets to demonstrate platform survivability based on performance of vulnerability reduction features.

TEST AND EVALUATION ASSESSMENT

In the past year, the H-1 Upgrades System Development and Demonstration aircraft have matured markedly, thanks to the program’s approach of keeping System Development and Demonstration test aircraft configuration identical to the

production design. Solutions to problems discovered in earlier testing have been implemented to strengthen the tail boom, eliminate tail boom overheating, improve targeting performance of the AH-1Z, and achieve required UH-1Y mission range. Aircraft performance, reliability, and maintainability results were positive, but not conclusive given the limited scope of OT-IIB. Risk areas remain for software integration of mission equipment, reduction of false alarm rates for maintenance diagnostic tools, and accessibility of components behind the rear seat of the AH-1Z.

Throughout OT-IIB, the UH-1Y and AH-1Z demonstrated remarkable performance compatibility that enhanced mission planning and execution. Similarities in aircraft communications, speed, maneuverability, range, and endurance enabled both aircraft to provide complementary and mutual support during in-flight and objective area portions of all joint missions. H-1 Upgrade aircraft were used nearly interchangeably on several missions enhancing mission flexibility. In the objective area, the maneuverability, speed, and agility of both aircraft were much improved over legacy aircraft performance.

Both aircraft demonstrated in OT-IIB that they have the potential to perform a variety of key mission requirements in daylight and favorable weather conditions. Several concerns remain. Pilots reported unreliable communications on some radio nets and did not use secure, anti-jam, or satellite communications during the test. Pilots wore the Helmet Mounted Sight and Display system during daylight missions and reported that the display was occasionally unreadable, the helmet was uncomfortable, and it restricted visibility in aft sectors. The AH-1Z targeting system provides high fidelity infrared images, but needs additional refinements to automatic and manual target tracking software. In 2.75-inch rocket firing testing after OT-IIB, AH-1Z engines suffered damage from ingestion of rocket plume exhaust. New restrictions on the employment of multiple simultaneous rockets may be required to accommodate the new aerodynamic environment of the four-bladed aircraft. In the report of test results from OT-IIF, the Commander, Operational Test and Evaluation Force rated the risk red in the critical operational issues of weapons employment, targeting, mission planning, and tactics. In addition, they rated suitability critical operational issues red in maintainability, human factors, and documentation.

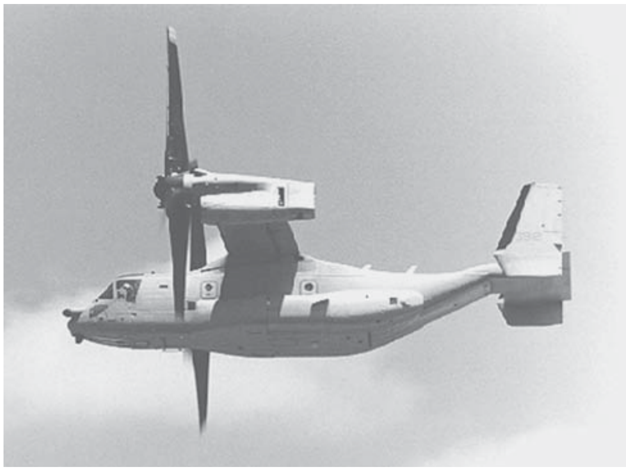
During OT-IIB, both aircraft were generally reliable and available to conduct missions when required. Both aircraft supported an aggressive flight schedule and rarely required unscheduled maintenance. While maintainability statistics were generally good, the placement of radio components behind the rear seat of the AH-1Z makes component replacement a time-consuming and tedious task. Diagnostic tools, still under development, were useful but still have a high rate of false alarms.

Both aircraft should be more survivable and crashworthy than their predecessors. However, testing in FY04 showed the main rotor gearbox was vulnerable to ballistic threats that impact high-pressure oil passages. The ballistic damage resulted in severe cracking, followed by a rapid loss of lubrication. Testing demonstrated that gears catastrophically failed after running 17 minutes under load with no lubrication. (The specification requires 30 minutes runtime without lubrication.) Otherwise, testing has demonstrated that the components of the AH-1Z and UH-1Y will retain or exceed the degree of damage tolerance found in their predecessors. The full-up system level ballistic tests of the AH-1Z is scheduled for FY05. A battle damage repair team plans to participate in the component-level tests and full-up, system-level live fire testing to update the aircraft system maintenance procedures based on the battle damage caused by realistic threats.

V-22 Osprey

SUMMARY

- Since returning to flight in 2002, the event-based test program has flown over 1,700 hours in developmental and operational testing.
- The program operates in an environment of open communication among all participants.
- The tiltrotor Operational Test and Evaluation (OT&E) squadron, VMX-22, is finalizing planning and training for a second phase of IOT&E called Operational Evaluation (OPEVAL) II.



OT-IIF demonstrated several encouraging aspects of the V-22 Block A configuration.

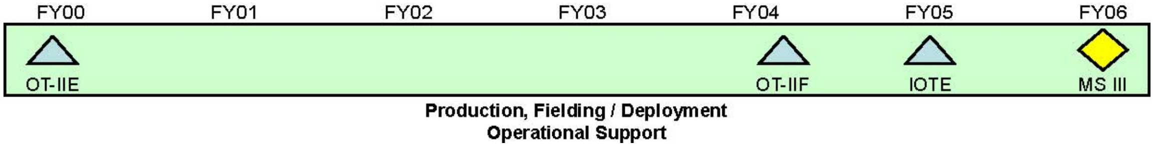
SYSTEM DESCRIPTION AND MISSION

The V-22 Osprey is a tilt-rotor vertical/short takeoff and landing multi-mission aircraft developed to fill multi-Service combat operational requirements. The MV-22 will replace the current Marine Corps medium-lift assault helicopters (CH-46E and CH-53D). The Air Force intends the CV-22 to provide a long-range vertical takeoff and landing insertion and extraction capability and to supplement the Special Operations Forces MC-130 aircraft. The tilt-rotor design combines the vertical flight capabilities of a helicopter with the speed and range of a turboprop aircraft, permits aerial refueling, and allows for worldwide self-deployment. The current design also affords a greater degree of survivability than existing medium lift helicopters.

DOT&E completed an independent evaluation of test adequacy, operational effectiveness, suitability, and survivability and submitted the required OT&E and Live Fire Test and Evaluation (LFT&E) reports to the Secretary of Defense and congressional defense committees in November 2000. Based in part on the findings in these reports, the Navy delayed its planned Milestone III decision. All V-22 flying was halted following the V-22 mishap in December 2000.

During the non-flying period, the program conducted complete design reviews of all critical V-22 systems. Simultaneously, the Integrated Test Team designed an extensive developmental and operational test program to address concerns raised by several high-level independent review panels and to support the fleet's return to flight. DOT&E participated in these reviews and approved a revised Test and Evaluation Master Plan.

TEST AND EVALUATION ACTIVITY



The first MV-22 returned to flight on May 29, 2002. To date, a ten-aircraft developmental flight test program has amassed over 1,800 flight hours plus extensive ground test and simulation. The approach to return the V-22 to operational flight continues to be event-based; each block of testing begins only upon completion of the necessary preceding test events. After a thorough ground-test of the flight control software in laboratories and simulators and flight validation, the first priority was high-rate of descent (HROD) flight-testing to investigate vortex ring state (VRS). In addition, limited testing of low-speed maneuvering flight and simulated all-engines inoperative, airplane-mode entry and stabilized descent were conducted to validate an emergency landing profile.

On August 28, 2003, the Marine Corps activated a new tilt-rotor test squadron, VMX-22. The squadron, which reports to the Navy's Commander, Operational Test and Evaluation Force, was to plan and conduct OT&E and develop tactics, techniques, and procedures for the operational employment of the V-22. VMX-22 conducted an operational assessment (OT-IIF) under a DOT&E-approved test plan in May-June 2004. OT-IIF served two purposes:

- To assess whether the design changes to the Block A configuration degraded previously demonstrated performance.
- For VMX-22 to rehearse procedures and communications to be employed in a major operational test.

OT-IIF consisted of 45 missions and 123 flight hours, primarily at Marine Corps Air Station New River, North Carolina.

Training flights and planning are under way for a second phase of IOT&E (OPEVAL II, or OT-IIG) to address most of the issues raised in the November 2000 OT&E report (testing not conducted, waived items, and correction of deficiencies). Overall degree of mission accomplishment by a sea-based Marine Expeditionary Unit equipped with MV-22 aircraft will be evaluated in OPEVAL Phase Two, planned to begin in February 2005. Following OT-IIG, DOT&E will submit its beyond low-rate initial production report containing an assessment of test results and the design changes.

TEST AND EVALUATION ASSESSMENT

Based on developmental tests since returning to flight, DOT&E has increased confidence that the V-22 characteristics involving VRS are understood and knowledge of VRS consequences is widespread in the V-22 community. These factors tend to reduce the likelihood of another mishap caused by VRS:

- Extensive HROD testing has confirmed the V-22 VRS envelope with much more fidelity. The flight conditions necessary to enter VRS are close to what had been predicted early in development.
- Published operating limitations appear adequate for normal conditions and the program is investigating an expanded operating envelope.
- In HROD maneuvering testing inside the VRS region, pilot control inputs delayed roll-off and did not precipitate it.
- The flight simulators and flight syllabus emphasize avoiding VRS.
- Flight manual cautions, warnings, and advisories were amended.
- A HROD warning system is present for both pilots and appears functional.
- Readability is improved for the pilots' vertical speed indicator.
- Nacelle tilt is a powerful VRS recovery tool, demonstrated and understood.

For any rotorcraft, including the V-22 tiltrotor, the ability to save the aircraft – or at least ensure the survival of its occupants – in the event of a single or dual engine failure must be determined. In either the airplane or helicopter mode, the recommended procedure in the event of an engine failure is to convert to airplane mode, proceed immediately to a suitable landing spot, convert back to helicopter mode, and land as soon as possible.

The ability of the V-22 to perform single-engine landings is better than the helicopters it replaces. In the event of either sudden dual-engine failures, or a single failure of one engine coupled with a failure of the interconnecting drive train - while the aircraft is in either conversion or in the helicopter mode, the recommended method to recover is to tilt the nacelles down and attain the best glide speed available, then flare to a survivable landing.

Although testing of this procedure all the way to landing is not practicable, limited testing has confirmed that, while the aircraft can perform an autorotative descent, it cannot autorotate to a safe landing. The approach to safety adopted by the program long ago has been to minimize the possibility of such disastrous occurrences through system design.

OT-IIF demonstrated several encouraging aspects of the V-22 Block A configuration:

- Improved performance:
  - Self-deployment and assault mission range.
  - Short takeoff distance.
  - Cruise airspeed.
  - External lift of the prototype lightweight 155 mm howitzer.
  - Excellent handling qualities.
- Formation flight and two-ship approaches to a landing zone, and superior ingress and egress performance.
- Significant improvements in fasteners used in the airframe.

- Improved displays in the cockpit, and better aircrew alerts.
- Better outward-opening cockpit door.

Some concerns remain following OT-IIF:

- The scope of OT-IIF was insufficient for high confidence conclusions regarding reliability, maintainability, and availability. However, using the VMX-22 operational flight hours does give a reasonable amount of data (over 800 fight hours), and also suggests only marginal mean flight hours between aborts and availability.
- Communications in anti-jam mode and long-range communications.
- Environmental comfort in the cabin.
- Defensive maneuvering was not fully demonstrated because of flight clearance limitations based on testing to date.
- During confined area landings in desert environments, dirt and debris in the cockpit and throughout the aircraft remains an issue.

Detailed planning is under way for OT-IIG (OPEVAL II) in 2005. That test will support a complete evaluation of Block A effectiveness and suitability in realistic operations, and will support the Secretary's certification of effectiveness under Section 123 of the FY02 Defense Authorization Act. Most of the operational tasks required under Section 123 have been performed satisfactorily in developmental or combined developmental test/operational test.

VXX Presidential Helicopter Program

SUMMARY

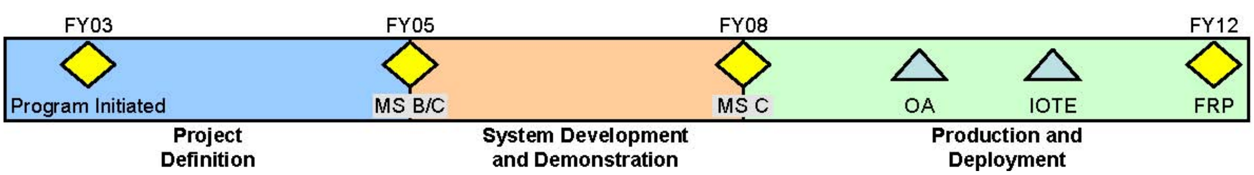
- VXX Program will deliver a dual-piloted, multi-engine vertical take-off and landing aircraft that:
  - Provides safe, reliable transportation for the President
  - Incorporates an executive-style interior
  - Is capable of operations in varied and at times adverse climatic conditions
  - Provides a wide range of communications systems
  - Provides reserve capability in all areas to allow future mission growth
- The VXX Program will field two increments of capability. The Initial Operational Capability (IOC) will occur with the fielding of four Increment 1 aircraft in October 2009.
- Increment 2 aircraft satisfy all requirements. The VXX Program objective is to field Increment 2 capability as soon as practicable.
- An Analysis of Alternatives study determined that two helicopters have the potential to satisfy the requirements: the Sikorsky S-92 and the Lockheed Martin-Augusta Westland-Bell Helicopter Textron US 101.

The VXX will be the primary Presidential vertical-lift platform employed by Marine Helicopter Squadron One.

SYSTEM DESCRIPTION AND MISSION

The VXX will be the primary Presidential vertical-lift platform employed by Marine Helicopter Squadron One. The added emphasis on rapid and reliable Presidential transportation requires a fielded replacement to the SH-3. The VXX program will use a two part incremental development. Increment 1 VXX aircraft will provide the necessary capability for IOC in October 2009. The Increment 1 aircraft configuration will provide a communications capability equal to or greater than the VH-60N and executive accommodations equal to or greater than the VH-3D. The VXX Increment 2 aircraft will use maturing technology to improve and provide additional required capabilities. The operational requirement is to field 23 Increment 2 configured aircraft.

TEST AND EVALUATION ACTIVITY



The VXX Program is Pre-Milestone B. DOT&E did not approve the Test and Evaluation Plan (TEMP) and non-concurred with the Acquisition Strategy. DOT&E anticipates an operational assessment for Increment 1 aircraft in FY09 and an initial operational test and evaluation of Increment 2 capability in FY11. Live fire test and evaluation (LFT&E) will be a significant component of the testing of the VXX aircraft.

TEST AND EVALUATION ASSESSMENT

DOT&E did not approve the TEMP for the following reasons:

- The program is schedule versus event driven. The program has a high degree of concurrent testing and production.
- The level of testing outlined in the TEMP is adequate, but the schedule to conduct the required testing is not executable.
- The program acquisition strategy violates the fly before buy concept. Low-rate Initial Production lots 1 and 2, for Increment 2 aircraft, do not benefit from insights gathered during the operational assessment.
- The LFT&E program is adequate, but Increment 1 aircraft will not benefit from vulnerability and survivability insights gathered during live fire testing.
- Increment 1 aircraft are unlikely to field a system that is as good as the SH-3 in the area of suitability and maintainability.

DOT&E recognizes the imperative to field a system that meets requirements as soon as possible. The Increment 1 aircraft test schedule is not executable. Increment 2 capability fully satisfies the user's requirement, but the Acquisition Strategy is an inefficient approach to fielding Increment 2. Risk reduction and robust execution of a test-fix-fly program requires additional schedule margin. Each phase of the program requires meaningful exit criteria. These intermediate checkpoints will assist in reorienting the program to an event-based test program and provide decisions that are more informed.

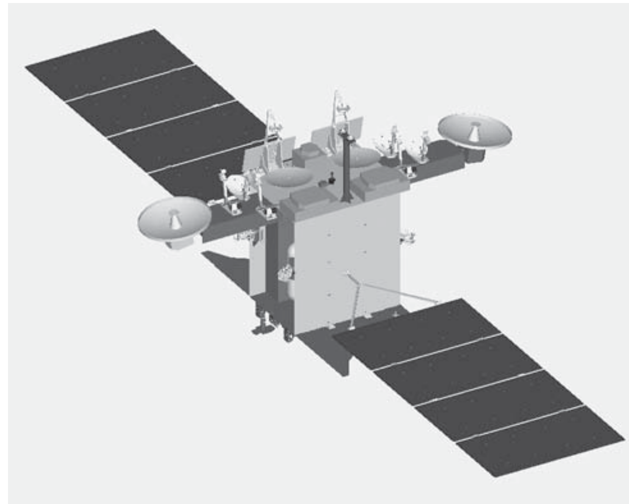
Air Force Programs

Air Force Programs

Advanced Extremely High Frequency (AEHF) Satellite Communications System

SUMMARY

- The Air Force is making progress on the four major technology risk areas – nuclear hardening and shielding, nuller spot beam, phased array antenna, and electric propulsion.
- Special attention will be required in testing capabilities not adequately tested or deferred under Milstar program. These areas include mission planning and the nulling antenna.
- The synchronization of Service terminal programs remains critical for both launch and operational testing.



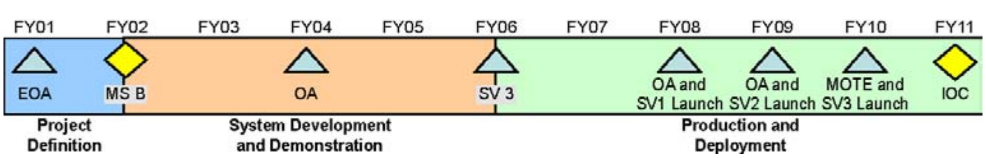
AEHF satellite communications system is designed to provide secure, survivable communications to U.S. warfighters during all levels of conflict.

SYSTEM DESCRIPTION AND MISSION

The Advanced Extremely High Frequency (AEHF) satellite communications system is designed to provide secure, survivable communications to U.S. warfighters during all levels of conflict. It will follow Milstar as the protected backbone of DoD's military satellite communications architecture, will increase system capacity by a factor of ten, and will increase the maximum data rate for an individual terminal from 1.544 Mbps to 8.192 Mbps. The first flight of the AEHF satellite program, named "Pathfinder", will be programmed to operate initially as a Milstar II satellite in order to complete the Milstar II constellation. The second flight will then be launched as a fully capable AEHF satellite. After it is operational, Pathfinder will be reprogrammed on-orbit as an AEHF satellite.

The first three program phases: AEHF Technology, Engineering Models, and System Definition are complete. At Milestone B, the Defense Acquisition Board authorized fabrication and assembly of the first two satellites (SV1, SV2), development and deployment of the ground command and control segment, and advanced procurement for one additional satellite (SV3) within the Future Years Defense Program. Following completion of the system-level Critical Design Review, a separate, tailored Milestone C was anticipated to provide the final authorization for production of SV3, SV4, and SV5. However, a February 2003-approved Acquisition Program Baseline incorporated a revised strategy that deleted SV4 and SV5. The strategy also discussed a decision point in 1QFY05 to evaluate Transformational Communications development and the need, if any, for additional AEHF satellites. The first AEHF launch is scheduled for 3QFY08 with the subsequent launches in 3QFY09 and 3QFY10.

TEST AND EVALUATION ACTIVITY



The Air Force Operational Test and Evaluation Center performed an early operational assessment and operational impact assessment in support of the Milestone B decision in 4QFY01. An operational assessment was conducted in FY04 in conjunction with the Critical Design Review. The Air Force Operational Test and Evaluation Center has not yet released the results of this operational assessment.

The Air Force will conduct a second operational assessment in FY07 to assess readiness of the AEHF Mission Control Segment to support the first AEHF launch. An operational assessment in FY07 will evaluate the results of the developmental test/operational test performed on the Pathfinder satellite to verify its full capability to function as a Milstar II low-data-rate/medium-data-rate satellite. Multi-Service operational test and evaluation, to be conducted in FY09, will evaluate whether the entire system, including equipment, personnel, procedures, training, and logistics support, is effective and suitable based on the operational requirements. The test will exercise satellite-to-satellite cross-links to evaluate theater-to-theater communications, network control, satellite control, and interoperability.

TEST AND EVALUATION ASSESSMENT

The system Program Office is making satisfactory progress on the four major technology risk areas: nuclear hardening and shielding, performance of the nuller spot beam, performance of the phased array antenna, and electric propulsion. Terminal synchronization remains essential for mission control and for a successful multi-Service operational test and evaluation. Monitoring the fidelity of the AEHF Universal System Test-Terminal simulator and the payload simulators is also imperative. If their configurations do not remain standardized and consistent with the true payload, the new terminals will not be compatible with the payload or with each other.

Also, modeling and simulation will assess nuller spot beam performance in a variety of single and multiple jammer scenarios. However, contractor model validation testing will be limited to only single jammer cases. DOT&E is concerned that the contractor needs more robust validation testing to reduce risks associated with using this model to evaluate nuller operational performance.

There is still a high program risk associated with the development of the cryptographic capability needed to integrate the AEHF extended data rate. This includes the manufacture of a highly complex Application Specific Integrated Circuit. Schedule slips in cryptographic development have consumed the entire available margin and are now pacing the program.

Advanced Medium Range Air-to-Air Missile (AMRAAM)

SUMMARY

- The Phase 3 missile that we will test in follow-on operational test and evaluation (FOT&E) is largely a new missile with distinct capability upgrades from previous versions of the Advanced Medium Range Air-to-Air Missile (AMRAAM).
- Operational testers plan to fire only ten missiles in this FOT&E period, so modeling and simulation will be a key part of our assessment of effectiveness.
- There are enough full-scale targets available for this test period, but future AMRAAM testing (after approximately FY10) will require the department to find a replacement for the QF-4 full-scale target.
- The Test and Evaluation Master Plan (TEMP) is current as of August 2004 and adequate for this FOT&E period.

The AIM-120 is currently employed by the F-15C, F-15E, F-16, F/A-18C/D, and the F/A-18E/F, as well as allied fighter aircraft.

SYSTEM DESCRIPTION AND MISSION

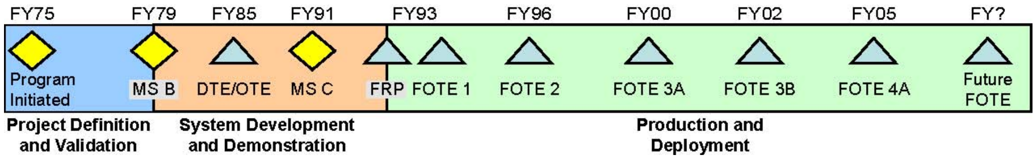
The AIM-120 AMRAAM is an all-weather, radar-guided air-to-air missile with launch-and-leave capability in both the beyond-visual-range and within-visual-range combat arenas. It enables a single-launch aircraft to simultaneously engage multiple targets with multiple missiles in a single pass. The Air Force and Navy, as well as several foreign military forces, use various versions of the AIM-120. The AIM-120 is currently employed by the F-15C, F-15E, F-16, F/A-18C/D, and the F/A-18E/F, as well as allied fighter aircraft. It will also be employed by the F/A-22 and the F-35 Joint Strike Fighter (JSF).

The AMRAAM program uses an acquisition strategy that improves missile capability through incremental software and hardware modifications that have been grouped into three pre-planned product improvement (P3I) phases. All are known as the AIM-120C. Phase 1 (AIM-120C-3) was developed in the mid-1990s and incorporated clipped wings to enable the F/A-22 to carry additional missiles in its internal weapons bays. This variant is compatible with all aircraft that carried earlier variants of the AIM-120. Phase 2 improvements incorporated a new warhead (AIM-120C-4), lengthened rocket motor (AIM-120C-5), and new target detection device (AIM-120C-6). All current production deliveries to U.S. forces are the Phase 2 configuration.

Phase 3 of the AMRAAM P3I development program plans to improve weapons systems effectiveness and lethality and provide the system with the capability to deal with emerging threats. The Phase 3 missile, designated AIM-120C-7, includes new guidance section hardware and software. Raytheon incorporated the following key changes in the Phase 3 upgrade:

- Upgraded antenna, receiver, and signal processing portions of the missile to satisfy operational requirements to counter new threats.
- Smaller electronic components to create room for future system growth.
- Re-hosting some elements of the existing software to a new higher-order programming language (C++).
- Re-hosting and modifying some existing software to function with the new hardware.
- Developing new software algorithms that will enable the system to deal with newly defined Phase 3 threats.

TEST AND EVALUATION ACTIVITY



DOT&E approved the initial AMRAAM TEMP for the P3I Phase 3 missile in June 2002. DOT&E approved the revised TEMP which time-phases the Phase 3 development and defers certain operational capabilities to a follow-on software upgrade program in August 2004. Developmental test and evaluation of the Phase 3 missile is complete. It included captive-carry missions, hardware-in-the-loop laboratory testing, and live end-to-end guided launches of instrumented test missiles.

During the development test phase, the test team attempted nine Phase 3 missile launches over six discrete launch scenarios. One scenario was repeated twice (hangfire, control section failure); a second scenario was repeated once (shooter aircraft miscue). Six launches met the development test objectives necessary to obtain the end-game scoring data essential to development and validation of the modeling and simulation suite of computer models used in the AMRAAM program to determine overall missile effectiveness.

The Air Force's 53d Wing and the Navy's Air Test and Evaluation Squadron NINE will conduct the Phase 3 FOT&E under the oversight of the Air Force Operational Test and Evaluation Center and the Navy's Commander Operational Test and Evaluation Force starting in late 2004, and continuing through the end of 2005. The FOT&E will consist of captive-carry missions, an extensive computer simulation effort using the Tactical AMRAAM Simulation model developed by Raytheon, and live guided missile launches. Raytheon delivered the AMRAAM modeling and simulation suite to the government organizations that must understand and validate its use in determining overall weapons system effectiveness during FOT&E. Raytheon has trained government analysts in the use of the Tactical AMRAAM Simulation model.

During the FOT&E, ten missiles will be launched against threat-representative aerial targets operating in various demanding operationally realistic tactical scenarios. The evaluation will include integration of the missile on the F-15, F-16, F/A-18C/D, and F/A-18E/F aircraft. In accordance with the TEMP, free-flight missile events will be repeated as necessary to ensure that AMRAAM capabilities in the discrete test scenarios are fully evaluated.

TEST AND EVALUATION ASSESSMENT

The Phase 3 missile is largely a new missile with distinct capabilities from previous variants of the AIM-120. In particular, there are significant hardware and software changes in the guidance section of the missile. The Navy and Air Force desire these improvements in system performance and capability to increase their air-to-air combat capabilities. However, as acknowledged in the revised TEMP, the current program will not deliver all Phase 3 capabilities originally required in its joint operational requirements document, with some capabilities now being deferred to a follow-on software upgrade program. In the upcoming FOT&E, DOT&E will independently assess the impact of any required capability that is not fully developed and operationally tested when reporting on the operational effectiveness and suitability of the missiles actually tested.

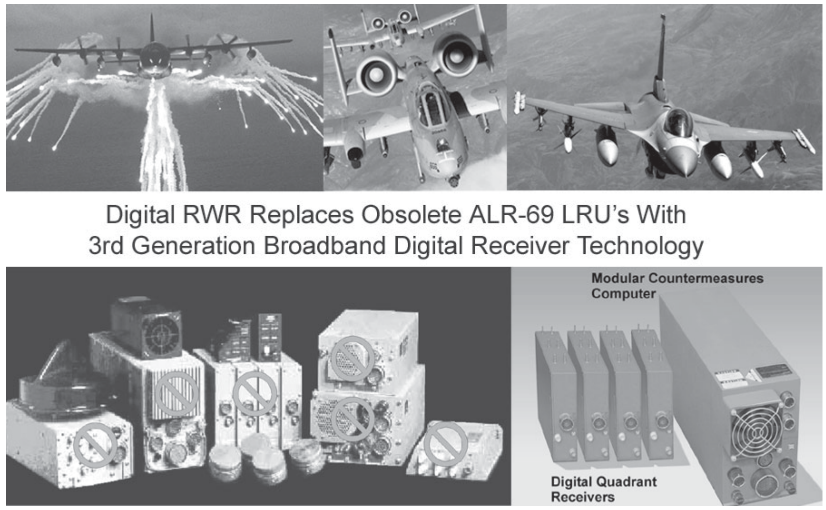
During the development test and evaluation effort, a number of aircraft integration issues were encountered. These included problems with aircraft radar fire control systems, stores management software, and missile launchers. The Air Force assessed these issues as not pertinent to the technical development of the P3I missile, but the Services must address them in order to properly use the capabilities inherent in the P3I missile in operational service.

DOT&E continues to monitor development of the Tactical AMRAAM Simulation model and progress of the Phase 3 FOT&E program. The limited number of planned live test launches during FOT&E places a strong reliance on the use of modeling and simulation to confirm the full missile employment envelope and the overall operational effectiveness of the P3I Phase 3 AMRAAM missile. In the event that the modeling and simulation suite cannot be validated, operational testers will need to conduct additional live test shots during the FOT&E to ensure that the fleet and combat air forces receive the required P3I Phase 3 missile capability.

ALR-69A Radar Warning Receiver (RWR)

SUMMARY

- ALR-69A is a significant upgrade to the previous (ALR-69) system, with new hardware and potentially significant performance improvements.
- In the past, technical difficulties plagued the program.
- The modified Test and Evaluation Master Plan (TEMP) incorporates testing on both the C-130 and \ F-16 prior to the full-rate production decision to buy ALR-69A systems. Adequate testing on each of the additional installations (e.g., C-17, A-10, etc.) is necessary before a full-rate production decision.
- Operational assessment (OA) is to start in FY05.



The modified Test and Evaluation Master Plan incorporates testing on both the C-130 and F-16 prior to the full-rate production decision to buy ALR-69A systems.

SYSTEM DESCRIPTION AND MISSION

The ALR-69 has served as the RWR for multiple aircraft types since the early 1970s. In 2001, the Air Force established a modification program to improve reliability, maintainability, and performance. The resulting system, designated the ALR-69A, will require only minor changes to the aircraft installation provisions.

The initial program addresses equipment for the Air Force Special Operations Command C-130 variants, Air Mobility Command (AMC) C-130s, and F-16 aircraft. AMC C-130 is not formally part of the program, but is providing risk reduction aircraft and a backup lead test platform if necessary. This effort will reduce the number of line replaceable unit types in the system from nine to five, and the total number of line replaceable units from twelve to eight.

There are four phases of the ALR-69A program upgrade:

- The first phase – Core Phase
- The second phase – Spiral 1
- The third phase – Spiral 2
- The fourth phase – Spiral 3

The Core phase (funded) addresses the issue of obsolescent parts and incorporates digital receiver technology for initial C-130 and F-16 installations.

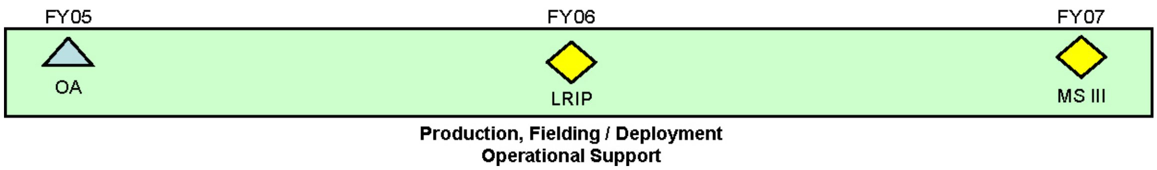
Spiral 1 Single-ship (partially funded) is intended to incorporate software algorithms and deliver geolocation capability. Geolocation fidelity will approach that which is needed for weapon targeting requirements.

Spiral 2 Multi-ship (partially funded), the Advanced Tactical Targeting Technology, will incorporate new software. It will also incorporate an additional circuit card in the processor line replaceable units to enable threat geolocation good enough to support Global Positioning System-guided weapons employment and weapons targeting accuracy.

Spiral 3 (unfunded), the Specific Emitter Identification, is planned to incorporate new software to provide robust specific emitter identification that will enhance correct threat identification and lessen ambiguities.

Since the program's initiation, the program has suffered from technical difficulties that have resulted in schedule delays. Development costs have grown from $36 million to $72 million. However, Core phase development is proceeding.

TEST AND EVALUATION ACTIVITY



The Air Force Operational Test and Evaluation Center plans to conduct an OA in FY05 to support a low-rate initial production (LRIP) decision scheduled for 1QFY06. The OA will evaluate a pre-production system and will not include developmental flight tests because of a lack of flight-qualified systems, but will include C-130 aircraft installation measurements and ground tests. DOT&E considers the draft OA plan to be adequate to support the LRIP decision. FY05/FY06 operational testing on both the C-130 and F-16 precedes the Milestone III decision in 1QFY07 for the C-130 and F-16 Group B production.

TEST AND EVALUATION ASSESSMENT

An initial draft TEMP, which addresses the Core phase, is currently in review. This draft TEMP and an OA test plan must be fully coordinated and approved before the test begins. Spirals 1, 2, and 3 will require updated versions of the TEMP. Although DOT&E considers the OA plan adequate, test results will include only minimal flight testing at best, and will not use production-representative systems. This increases the risk that the system will enter LRIP with effectiveness and suitability deficiencies that will require corrections prior to fielding on several aircraft types. The program office should mitigate this risk by minimizing LRIP deliveries (less than 10 percent of the planned and funded C-130 and F-16 purchase).

The program plans to use a favorable Milestone III decision as clearance to buy all units for other installations (e.g. A-10, C-17, C-130J, MH-53) with only minimal testing to verify each installation. The ALR-69A should be tested on each individual aircraft prior to the acquisition decision-makers approval of the acquisition of those units. This issue will be resolved in the TEMP review and approval process.

B-1B Conventional Mission Upgrade Program (CMUP)

Operational testing of the B-1B confirms the effectiveness and suitability of this weapon system when employing the JSOW and JASSM weapon.

SUMMARY

- Initial operational testing of the B-1B Block E identified shortfalls in weapon system effectiveness and suitability. Follow-on operational testing confirms fixes to these shortfalls are effective and suitable. However, false target generation in the Interleaved Search and Track mode of the radar and false failure indications produced by the onboard diagnostic system continue.
- Operational testing also confirmed that the B-1B is effective and suitable when employing the Joint Stand-Off Weapon (JSOW), the Joint Air-to-Surface Standoff Missile (JASSM), the 2,000-pound variant of the Joint Direct Attack Munition (JDAM), and both the Combined Effects Munition (CEM) and Sensor Fuzed Weapon (SFW) variants of the Wind-Corrected Munitions Dispenser.
- Fielded accuracy of representative loads carried by the B-1B during JSOW and JASSM integration operational testing also meet requirements.
- DOT&E approved the B-1B JSOW and JASSM integration test and evaluation master plan in December 2003.

SYSTEM DESCRIPTION AND MISSION

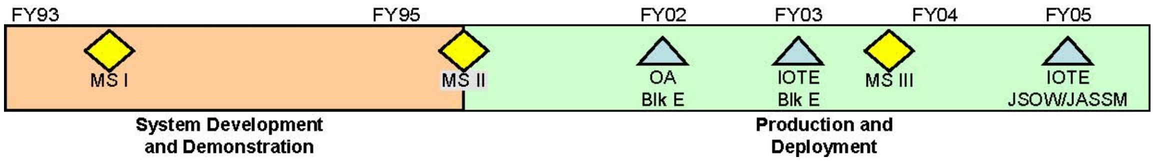
The B-1B, produced by The Boeing Company, is a variable-geometry heavy bomber. The aircraft has four afterburning turbofan engines and its maximum takeoff weight is 477,000 pounds. With air refueling, the B-1B's four-man crew can deliver approximately 50,000 pounds of conventional bombs or precision-guided weapons to targets anywhere in the world at penetration speeds up to Mach 1.2.

The Air Force conducted Initial Operational Test and Evaluation (IOT&E) of the B-1B from 1984 through 1989. The B-1B achieved initial operating capability as a nuclear bomber in FY87. Starting in 1993, the Conventional Mission Upgrade Program (CMUP) marked the aircraft's transition from a nuclear to a conventional role. Initial conventional load was limited to 84 Mark-82 500-pound general-purpose bombs. Block changes carried out under the CMUP have enhanced the aircraft's capabilities as follows:

- Software upgrades to offensive and defensive systems (Block B).
- Capability to deliver CBU-87/89/97 cluster bombs (Block C).
- Communication system upgrades, addition of Global Positioning System navigation, and the capability to deliver the GBU-31 Joint Direct Attack Munition (Block D).
- Avionics computer upgrade to enable the delivery of three different weapon types (one type from each weapon bay) on a single mission and the capability to employ Wind Corrected Munitions Dispenser weapons (Block E).

In addition to these block upgrades, the remaining capability enhancement planned for the B-1B under the CMUP is the integration of the JSOW and the JASSM.

TEST AND EVALUATION ACTIVITY



Initial operational testing of the B-1B Block E identified shortfalls in weapon system effectiveness and suitability. Follow-on operational testing confirms fixes to these shortfalls are effective and suitable. This effort concluded with the completion of JSOW and JASSM integration operational testing. Developmental flight-testing to integrate JSOW and JASSM weapon capability on the B-1B began in March 2003. Operational testing began in December 2003 and concluded in August 2004. The program combined developmental and operational testing and evaluation with a small, independent operational test and evaluation phase to confirm the results of the combined developmental test/operational test. Scheduled events consisted of JSOW and JASSM separation test vehicle performance and the transfer of targeting data to JSOW and JASSM captive flight vehicles. The B-1B employed full and multiple bays of captive-carried JSOW and JASSM weapons as part of realistic operational testing. The release of a representative load of the qualified inventory of B-1B Block E weapons also occurred to ensure JSOW/JASSM integration software had not degraded fielded accuracy capability. The confirmation phase concluded with the release of a guided JSOW and JASSM weapon as well as the release of the 2,000-pound variant of JDAM, and both the CEM and SFW variants of the Wind-Corrected Munitions Dispenser.

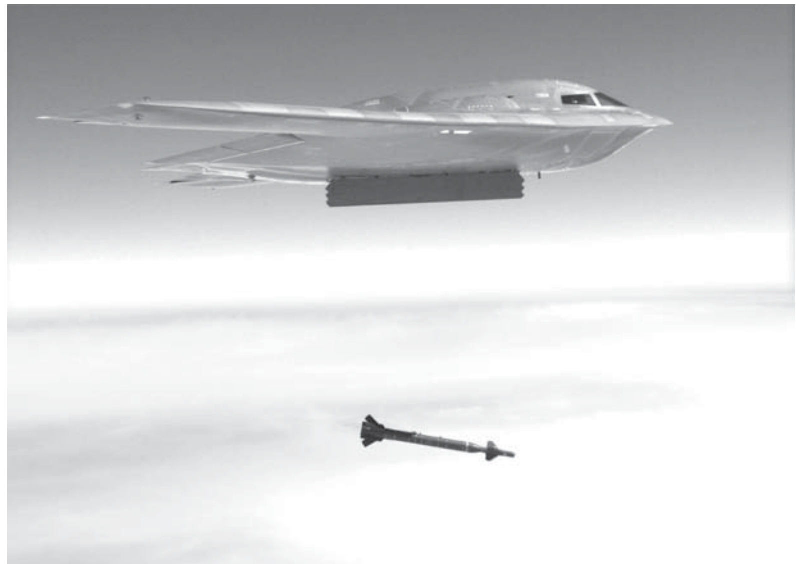
TEST AND EVALUATION ASSESSMENT

Operational testing confirmed shortfalls identified during B-1B Block E IOT&E are now effective and suitable. However, false target generation in the Interleaved Search and Track mode of the radar and false failure indications produced by the on-board diagnostic system continue. Operational testing also confirmed that the B-1B is effective and suitable when employing the JSOW, the JASSM, the 2,000-pound variant of the JDAM, and both the CEM and SFW variants of the Wind-Corrected Munitions Dispenser. Fielded accuracy of representative loads carried by the B-1B during JSOW and JASSM integration operational testing also meet requirements.

The B-1B LFT&E program for Block D identified a number of vulnerabilities to threats. These baseline vulnerabilities are also in Block E. However, there is no significant increase in vulnerability due to the addition of B-1B Block E-unique equipment.

B-2

SUMMARY



Initial operational testing of advanced high-frequency materials on the B-2 should conclude in FY05. The B-2 is effective and suitable when employing the 500-pound JDAM or the 5,000-pound, GPS-guided GBU-28B/B. Employment with the JASSM, however, is not resolved.

- DOT&E approved the Test and Evaluation Master Plan, which covers the B-2 and the B-2 Radar Modernization Program, in May 2004.
- Operational test and evaluation confirmed that:
  - Improvements to B-2 materials, such as a new primer/sealer as well as the re-design of a seam around the engine bay doors, should improve future mission capable rates.
  - The SCI-2K system appears to improve upon the low observable (LO) Combat Readiness Model's ability to confirm B-2 LO combat readiness.
  - Satellite communications capability and VHF radio upgrades are effective and suitable. However, transmit/receive capability of VHF frequencies is very broad and may not be suitable for peacetime use outside the continental United States.
  - Employment of the B-2 with the 5,000-pound GBU-28B/B GPS-guided weapon is effective and suitable for combat. Testing of the weapon in an operational scenario using off-board lasing is required to confirm full functionality.
- The Defensive Management System now provides adequate situational awareness to avoid pop-up threats, but only in less dense threat environments.
- A beyond line-of-sight capability to monitor LINK-16 transmissions prior to B-2 arrival in the theater of combat operations is not effective or suitable.
- Aircraft operational flight program software updates to enable compensation for wind effects on the aircraft when in turns and to rectify targeting coordinate round-off errors are effective and suitable.
- Developmental testing under the B-2 Radar Modernization Program continues to make progress. Milestone B occurred in August 2004.

SYSTEM DESCRIPTION AND MISSION

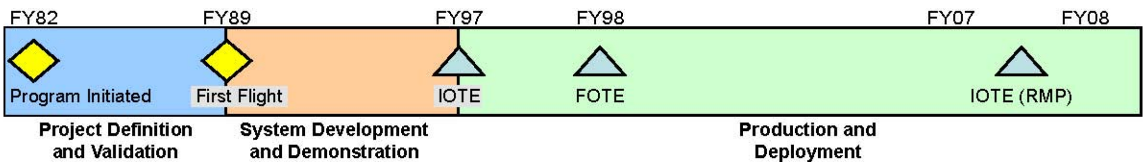
The B-2, produced by Northrop Grumman, is a multi-role, LO bomber capable of delivering conventional and nuclear munitions. It has four turbofan engines and twin side-by-side weapons bays. System avionics include a multi-mode radar, Global Positioning System-aided navigation, a Defensive Management System for radar warning functions, and a Terrain Following/Terrain Avoidance system. The bomber's current principal weapon is the 2,000-pound Joint Direct Attack Munition (JDAM).

The basic aircraft continues to undergo multiple modifications, some of which are aimed at correcting deficiencies in the original aircraft design, while others are intended to enhance capability and improve the aircraft's operational effectiveness and suitability. Planned modifications for FY04 and beyond include addition of an extremely high-frequency satellite communication system, upgrades to the Defensive Management System, advances in LO materials,

Link-16 integration, weapon integration, and periodic software upgrades. Weapons being added include the Enhanced GBU-28 (GBU-28B/B) 5,000-pound GPS-guided weapon, the AGM-158A Joint Air-to-Surface Stand-off Missile (JASSM), and the 500-pound variant of the JDAM (GBU-38).

The B-2 radar requires an upgrade called the Radar Modernization Program (RMP) to move the radar to a new operating frequency. This upgrade is necessary to avoid interference with primary authorized users of the current B-2 radar frequency. The RMP will feature an active electronically scanned array and is scheduled to undergo IOT&E in FY07. The B-2 was employed in combat operations during Operation Allied Force (March through May 1999), Operation Enduring Freedom (October 2001), and Operation Iraqi Freedom (March through April 2003).

TEST AND EVALUATION ACTIVITY



FY04 operational test efforts focused on:

- Integration of the B-2 with the AGM-158A, GBU-28B/B, and the GBU-38.
- A new integrated aircraft radio system that enables UHF/VHF, satellite communication, and Have Quick II anti-jam operations.
- Updates to the Defensive Management System.
- The ability to calculate the effects of winds during turns.
- Improvements to rectify targeting coordinate round-off errors.

New systems operationally tested during FY04 also include:

- A beyond line-of-sight capability to monitor LINK-16 transmissions prior to combat arrival in theater.
- A flightline system (SCI-2K) using the radar from the CLOVerS system to facilitate determination of B-2 radar cross-section readiness for combat.
- Continued evaluation of sustainment upgrades to low-observable materials on the aircraft.

Development of the new B-2 radar continues. Developmental testing in FY04 consisted of corrosion, thermal stress, and mechanical stress testing to transmit/receive module housings. Developmental testing on a subset of a full radar transmit and receive module array also occurred in FY04.

The B-2 program is not under formal oversight for LFT&E. However, upgrades or modifications to the B-2 may alter aircraft baseline susceptibility. IOT&E of any modification will assess whether alteration to susceptibility occurs.

TEST AND EVALUATION ASSESSMENT

Review of shortfalls identified during initial and follow-on operational testing confirms:

- Overall mission capable rate can be sustained at levels well above requirement.
- The Defensive Management System now provides adequate situational awareness to avoid pop-up threats, but only in less dense threat environments.
- In a robust threat environment, the Defensive Management System cannot provide adequate situational awareness without increased system processing capability.

Review of operational testing in FY04 confirms the effectiveness and suitability of:

- A new primer/sealer, intended to mitigate fluid migration into areas that cause additional LO maintenance activity.
- Aircraft operational flight program software updates, which provide an ability to compensate for wind effects on the aircraft when in turns and to rectify targeting coordinate round-off errors.
- A new satellite communications capability and VHF radio upgrade. However:
    - The system is one-of-a-kind and is not Joint Tactical Radio System-compliant.
    - Side tone returns of the VHF system also possess an irritatingly tinny ring to the crew.
    - Transmit/receive bandwidth of VHF frequencies is very broad and may not be suitable for peacetime use outside the continental United States.
- Weapons employment.
    - The GBU-28B/B and the GBU-38 meet user specified criteria when integrated on the B-2.
    - Employment of the GBU-38 with the Joint Programmable Fuze also meets user specified criteria.
    - B-2 fielded weapons employment effectiveness remains undiminished.
    - However, confirmation of GBU-28B/B functionality when employed by the B-2 during off-board lasing operations still requires operational testing, scheduled for FY05.

Review of operational testing in FY04 confirms that the beyond line-of-sight capability to monitor LINK-16 transmissions prior to B-2 arrival in the theater of combat operations is not effective or suitable. The system suffers from interoperability and interface shortfalls with theater gateways such as Joint Range Extension and the Roll-on Beyond line-of-sight Extension system.

Review of operational testing to conclude in FY05 indicates:

- The re-design of a seam around the nozzle bay door, intended to reduce LO maintenance activity, may meet requirements.
- The SCI-2K system may improve upon the ability of flight-line maintenance to determine the LO combat readiness of the B-2. Operational testing through FY04 indicates that LO combat readiness of a B-2 can be accurately determined 50 percent of the time with the SCI-2K, as compared to the LO Combat Readiness Model's ability of 17 percent.
- B-2 employment with the JASSM is unresolved.
    - Two missions resulted in the launch of only one weapon, which fell short of the target upon transition to the terminal phase of flight.
    - While interface with the weapon appears suitable, determination of B-2 effectiveness when employing JASSM is dependent on the results of two remaining JASSM shots.

Review of developmental testing of the B-2 RMP through FY04 reveals:

- Corrosion, thermal stress, and mechanical stress of transmit/receive module housings resulted in no degradation to housing integrity or performance.
- Manufacturing of transmit/receive modules validates the production process.
- A subset of the transmit and receive module array demonstrates transmit and receive parameters as anticipated for this stage of development.

C-5 Avionics Modernization Program (AMP) and Reliability Enhancement and Re-engining Program (RERP)

SUMMARY

- DOT&E approved a combined C-5 Modernization Program Test and Evaluation Master Plan (TEMP) in October 2001 prior to the Milestone B review for Reliability Enhancement and Re-Engining Program (RERP).
- There are high schedule and capability risks for the C-5 Avionics Modernization Program (AMP) development and test programs. Full C-5 modernization depends upon the success of the AMP to enable the RERP.
- Generating test sorties, correcting software deficiencies, and completing required developmental test points continue to hamper AMP progress toward IOT&E. The final impacts to the AMP capabilities, the IOT&E schedule, and the RERP development timeline indicate the scheduled AMP IOT&E is at risk and will require program restructuring.

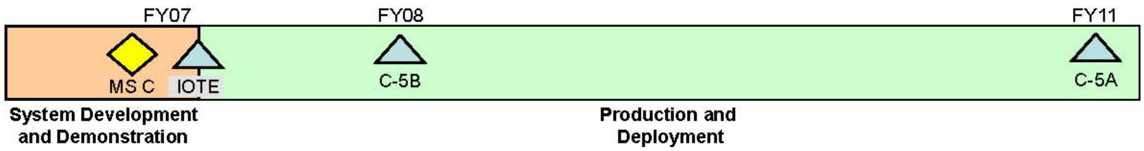
The C-5 components perform strategic airlift, emergency aero-medical evacuation, transport of brigade-size forces in conjunction with other organic aircraft, and delivery of outsize/oversize cargo.

SYSTEM DESCRIPTION AND MISSION

The C-5 is DoD's largest transport aircraft. Air Force active, reserve, and National Guard components perform strategic airlift, emergency aero-medical evacuation, transport of brigade-size forces in conjunction with other organic aircraft, and delivery of outsize/oversize cargo. The C-5 must perform global missions at night and in adverse weather, and be capable of receiving fuel in-flight. C-5As, built in the late 1960s, constitute approximately 60 percent of the 118-aircraft fleet at the end of FY04. C-5Bs were delivered in the 1980s.

C-5 modernization includes two sequential modifications, the AMP and the separate RERP. Full modernization incorporates a "glass cockpit" with digital avionics, as well as state-of-the-art communications, navigation, and surveillance/air traffic management functionality. It includes commercial engines, nacelles, thrust reversers, and pylons, plus extensive reliability improvements. The anticipated performance improvements are intended to optimize cargo-carrying capabilities, to include takeoffs and landings of fully-loaded aircraft on relatively short runways, and to meet the performance requirements of worldwide air traffic management initiatives. Additionally, the re-engining is intended to provide significant reliability, maintainability, and availability improvements. Other candidate sub-systems for reliability enhancement include the flight controls, hydraulics, environmental controls, electrical, and fuel system components.

TEST AND EVALUATION ACTIVITY



A test team that includes contractor and government personnel performing combined developmental and operational testing is located at the contractor facility in Marietta, Georgia. Co-locating Air Force developmental and operational test and evaluation teams at the factory has increased test efficiency, but the test duration has expanded due to developmental deficiencies. C-5 AMP laboratory and flight tests are behind schedule.

The first flight of a C-5 AMP aircraft (a B model) was accomplished in December 2002. A second AMP test aircraft (an A model) flew in August 2003. Software installation was originally planned to occur in four versions. Flight testing of versions 1.1 and 1.2 is complete. Only 61 percent of the test points for version 2.1 were accomplished, before moving on to version 2.2. From May 4 - June 19, 2004, flight testers scheduled three sorties per week, flew an average of 1.86 sorties per week, and accomplished 1.43 effective sorties per week. Generating test sorties, correcting software deficiencies, and completing required test points continue to hamper AMP development. The impacts to the AMP IOT&E schedule and the RERP development timeline indicate the scheduled AMP IOT&E is at risk and will require program restructuring.

The Air Force is currently conducting fire suppression system testing. The program completed the Man-Portable Air Defense System hardware-in-the-loop susceptibility tests in July 2004; data analyses are ongoing.

DOT&E approved a C-5 TEMP in October 2001, prior to a Milestone B review. We require an update to the TEMP before the start of AMP IOT&E.

TEST AND EVALUATION ASSESSMENT

Schedule and capability risks for the C-5 AMP development and test programs remain high. A proposal to complete AMP development in December 2004 could leave AMP-only aircraft without needed capabilities and could consume resources intended to increase aircraft reliability under RERP. If the AMP modifications are not completed as planned, the RERP schedule and capabilities will suffer further adverse impacts. C-5 modernization depends upon the success of AMP to enable RERP.

A preliminary reliability demonstration, included as part of the RERP IOT&E, is required prior to the RERP full-rate production decision. In the current TEMP, four aircraft are to fly approximately 200 sorties for approximately 800 flying hours between IOT&E and the reliability demonstration. Due to funding issues, the number of aircraft for developmental testing was reduced to three. This impacts the number of aircraft available for IOT&E. In order to assess the impact to IOT&E, AFOTEC is developing a model and the Air Mobility Command is providing field data. This model will be used to verify IOT&E planning and the viability of a three-aircraft reliability evaluation.

C-17A Globemaster III Aircraft

SUMMARY

- Based upon Initial Operational Test and Evaluation (IOT&E) completion in 1995, DOT&E evaluated the C-17 as operationally effective (with limitations) and operationally suitable.
- DOT&E approved an updated C-17 Test and Evaluation Master Plan (TEMP) in October 2004. The updated TEMP better addresses continuing flight tests, particularly the follow-on flight test program at Edwards Air Force Base, California, and operational testing by the Air Mobility Command.
- DOT&E is monitoring C-17 follow-on tests that verify correction of operational limitations.

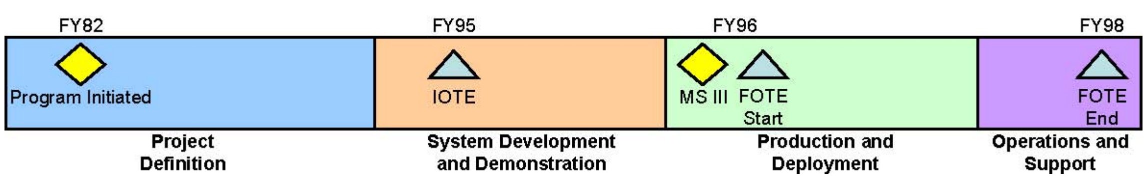
The C-17 delivery of outsize combat cargo and equipment directly into austere airfields.

SYSTEM DESCRIPTION AND MISSION

The C-17 is a four-engine turbofan aircraft capable of airlifting large payloads over intercontinental ranges without refueling. It is intended to allow delivery of outsize combat cargo and equipment directly into austere airfields. The C-17 is required to deliver passengers and cargo between continents, provide theater and strategic airlift in both air/land and air/drop modes, and augment aeromedical evacuation and special operations missions.

The Air Force conducted IOT&E of the C-17 in three phases from May 1992 to August 1995. Based upon results of IOT&E and Live Fire Test and Evaluation (LFT&E), DOT&E submitted an OT&E/LFT&E report to Congress to support the full-rate initial production decision in November 1995. The report assessed the operational effectiveness and suitability of the aircraft to conduct operational missions within the context of the existing airlift system. We evaluated the C-17 as operationally effective (with limitations) and operationally suitable. Combined developmental test and evaluation and follow-on test and evaluation involving the contractor, the Air Force Flight Test Center, the Air Mobility Command, and the Air Force Operational Test and Evaluation Center have occurred on a nearly continuous basis since the production decision in 1995.

TEST AND EVALUATION ACTIVITY



DOT&E is monitoring C-17 follow-on tests that verify correction of operational limitations. These include the Onboard Inert Gas Generating System (OBIGGS), introduction of the composite material horizontal tail, improved station-keeping equipment for formation flying, an extended range fuel containment system, crew protection armor, liquid oxygen bottle design, and changes related to the Strategic Brigade Airdrop mission.

One important survivability upgrade still in progress involves improvements to the OBIGGS. FY03 funding supported the initiation of a two-stage effort to improve OBIGGS. In stage one, reliability upgrades are being implemented for high failure rate items in the current OBIGGS system. In stage two, OBIGGS will be redesigned for improved reliability. The first production aircraft with the redesigned OBIGGS is aircraft P-138, planned for delivery in FY05. Aircraft with the original design of OBIGGS may not be retrofitted with the redesigned OBIGGS.

Developmental test and evaluation will continue at Edwards Air Force Base as part of the follow-on flight test program. The Air Mobility Command's test and evaluation squadron remains involved through ongoing communication with the program office and the combined contractor/government C-17 Test Team resident at Edwards Air Force Base. For future block upgrades, the Air Mobility Command will perform Force Development Evaluation, and the Air Force Operational Test and Evaluation Center will participate if full-scale follow-on operational test and evaluation events are required.

The C-17 aircraft are delivered in a block configuration with each block containing approximately fifteen aircraft. Block XV fielded the Terrain Collision Avoidance System Overlay improvement along with station-keeping equipment used in flying formation. Testing is scheduled to complete in 2004. The Block XVI will contain OBIGGS II, an avionics modernization package, and a weather radar modification with testing to complete in 2006. Additional enhancements, modifications, and corrections to existing deficiencies will happen concurrently and include a fuel system retrofit, main landing gear deficiency corrections, and a wheel brake and tire cost saving initiative. Detailed developmental and operational test planning is underway.

There were no LFT&E activities during FY04. The Air Force plans to conduct Composite Horizontal Tail LFT&E during the 1QFY05 that will complete the vulnerability testing on the current version of the C-17.

TEST AND EVALUATION ASSESSMENT

Only one dedicated test asset existed prior to this year (aircraft T-1). A lack of test assets has been a limitation since requests for flight test time on operational aircraft compete with high operational mission demands. Due to the combined efforts from the Program Executive Office, program office, the flight test center, the test team, and the user, an additional production representative aircraft will be provided to the test community to achieve a greater tempo of testing.

DOT&E approved the C-17 TEMP in October 2004. The updated TEMP better addresses continuing flight tests, particularly the follow-on flight test program at Edwards Air Force Base, California, and operational testing by the Air Mobility Command. The TEMP also defines the future LFT&E program. Specific operational test plans will also be submitted for DOT&E approval as defined in the TEMP.

C-130 Avionics Modernization Program (AMP) and Common Avionics Architecture for Penetration (CAAP)

SUMMARY

- The C-130 Avionics Modernization Program (AMP) and Common Avionics Architecture for Penetration (CAAP) Program were combined to accommodate Air Force navigation and safety initiatives, as well as civil communications, navigation, and surveillance for air traffic management requirements, and to add a variety of capabilities to Special Operations Forces C-130 aircraft.
- One development systems office, six system program offices, and two lead commands are participating in the basic C-130 AMP/CAAP program.
- The Navy/Marine Corps participation adds two additional program offices to AMP/CAAP management.
- DOT&E approved the C-130 AMP/CAAP Test and Evaluation Master Plan (TEMP) in 2002. An update is required due to program changes that will impact the sequence and scope of testing, plus the duration of planned tests.
- The first demonstration flight for partial C-130 CAAP capability is planned in March 2005, and the demonstrations will continue into 2006.
- A low-rate initial production decision (Milestone C) for both AMP and CAAP is currently planned for February 2006.

Modernized cockpits, with the replacement of aging and unreliable avionics and the addition of necessary equipment, will provide safety as well as new communications, navigation, and surveillance capabilities.

SYSTEM DESCRIPTION AND MISSION

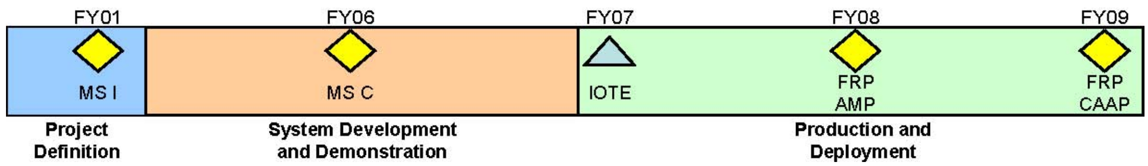
The C-130 AMP is intended to lower the cost of ownership of the U.S. military's legacy C-130 fleet, while complying with the Air Force Navigation and Safety Master Plan, required navigation performance requirements, and other applicable Communications, Navigation, and Surveillance/Air Traffic Management requirements. Modernized cockpits, with the replacement of aging and unreliable avionics and the addition of necessary equipment, will provide safety as well as new communications, navigation, and surveillance capabilities. The AMP modifications should reduce cockpit crew size as well as increase aircraft reliability, maintainability, and sustainability. AMP is also intended to improve precision airdrop capability for the combat delivery fleet, meet Night Vision Imaging System requirements, and improve the C-130's precision approach and landing capability. This program provides the interfaces necessary to integrate real time information in the cockpit. A standardized basic cockpit should allow initial training for pilots for any AMP cockpit and to undergo mission qualification upon reaching a specific unit. The CAAP will add a variety of other capabilities to Special Operations Forces aircraft.

A Milestone B decision resulted in the C-130 AMP contract in July 2001. As part of a Special Operations Forces acceleration effort, a Combat Talon I (MC-130E) will be modified in early October 2004 leading to demonstration of prototype radar and terrain following functionality. The first demonstration flight is planned in March 2005, and the pre-developmental testing will continue into 2006. Meanwhile, the System Development and Demonstration phase of the basic AMP design is focused on a first flight date for a modified C-130H2 early in 2006.

An integrated government/contractor test team will perform developmental test and evaluation flights. Air Force Operational Test and Evaluation Center personnel will participate as part of the government contingent in preparation for an AMP IOT&E beginning in the fall of 2007.

A low-rate initial production decision (Milestone C) for both AMP and CAAP is currently planned for February 2006 with full-rate production decisions for AMP and CAAP, respectively, in mid-2008 and late-2008.

TEST AND EVALUATION ACTIVITY



Since entering System Development and Demonstration, the AMP/CAAP efforts have experienced considerable programmatic turmoil. Impacts on test resources and test planning have been significant due to funding issues, new requirements, additional deliveries, and accelerated Special Operations capabilities. The combined operational test and evaluation, developmental test and evaluation, and live fire test and evaluation (LFT&E) teams have been working in concert to generate a comprehensive test strategy. The Integrated Test Team Working Group is formulating the specifics of the LFT&E program and the TEMP.

The successful testing of AMP and CAAP capabilities across a broad range of aircraft configurations and mission requirements will be a significant challenge. The users - from eight different commands, as well as the developers, from four Air Force and two Navy program offices - must commit to a unified fleet management approach for the funding, modification, and testing of all aircraft. Production representative aircraft in appropriate mission configurations will be one of the keys to successful operational testing. Concurrent development of different Mission Design Series modifications will add risk to the technical developments and to the schedule. At present, ten combined developmental/operational tests, two dedicated operational tests, and an undetermined number of follow-on operational tests are slated over the next four years.

The following table shows the different Mission Design Series of the Air Force C-130s to be modified and some of the special test requirements applicable to them:

C-130s and Special Test Requirements by **Mission Design Series (MDS)**

MDS	Nomenclature	Special Tests
C130E/H/H1/H2/H3	Combat Delivery	CNS/ATM Capabilities, Traffic Alert and Collision Avoidance System, Terrain Awareness Warning System, Night Vision Imaging System, Flight Management System
AC-130H/U	Gunship	Gunfire Accuracy, Enhanced Situational Awareness, Defensive Systems
EC-130H	Compass Call	Mission Unique
HC-130N/P	Combat Rescue	Mission Unique
MC-130E	Combat Talon I	Terrain Following/Terrain Avoidance Navigation
MC-130H	Combat Talon II	Terrain Following/Terrain Avoidance Navigation, Enhanced Situational Awareness, Defensive Systems
MC-130P	Combat Shadow	Mission Unique
LC-130H	Ski	Mission Unique

TEST AND EVALUATION ASSESSMENT

DOT&E approved an initial C-130 AMP/CAAP TEMP in September 2002 based upon an acquisition strategy that has been supplanted by restructuring the program. Due to funding changes, the program has slipped approximately two years in the execution of System Development and Demonstration, and the Special Operations Force aircraft effort has been expanded and accelerated. A new test and evaluation strategy to include an updated TEMP is still unresolved. Major issues facing the C-130 AMP/CAAP program include technical and schedule risks, production representative test articles for operational test, full-rate production decision dates, low-rate initial production quantities, revision of the Operational Requirements Documents, TEMP coordination and submittal, and additional Marine Corps and international participation. It does not appear that the current schedule includes the beyond low-rate initial production report timeline to support the full-rate production decision as it did at the previous Milestone decision. Since the acquisition strategy and the T&E strategy are not consistent, we recommend that a rationalization of the program be completed before the Special Operations Force demonstration flights begin in March 2005.

C-130J Family of Aircraft

SUMMARY

- Lockheed Martin initially developed specific versions of the C-130J for the British Royal Air Force and the Royal Australian Air Force.
- Approximately 70 percent of the U.S. variants represent new development and system integration relative to the legacy C-130s flying today.
- The C-130J was neither operationally effective nor operationally suitable in its Initial Operational Test and Evaluation (IOT&E) Phase I.
- The Air Force intends to deploy the C-130J to Central Command early in FY05, before the completion of IOT&E Phase II. Capabilities are limited.
- The C-130J Test and Evaluation Master Plan is being updated for approval in early FY05.
- C-130J operational testing will likely continue past 2008 as the program shifts to spiral development.
- There are no milestone decision reviews planned for any variant of the C-130J.

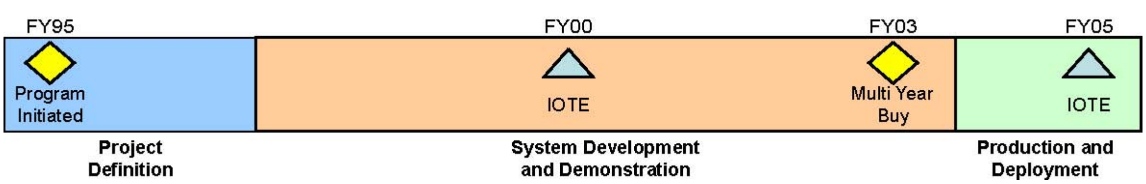
The basic C-130J is a medium-range, tactical airlift aircraft designed primarily for the transport of cargo and personnel within a theater of operations.

SYSTEM DESCRIPTION AND MISSION

The basic C-130J is a medium-range, tactical airlift aircraft designed primarily for the transport of cargo and personnel within a theater of operations. The cargo area can adapt to accommodate a combination of passengers, cargo, and/or aeromedical airlift missions. Variants of the C-130J are intended to perform missions such as fire fighting, weather reconnaissance (WC-130J), electronic combat (EC-130J), and aerial refueling (KC-130J). The combat delivery C-130J has more than 70 percent new equipment, relative to previous C-130 models. Significant differences include an advanced integrated digital avionics system, a redesigned flight station intended to facilitate a two-person cockpit, a new propulsion system intended to provide improved take-off, climb and cruise performance, and cargo handling system enhancements. The Air Force intends to deploy the C-130J to Central Command early in FY05, before the completion of IOT&E Phase II. Capabilities are limited.

DOT&E designated the C-130J aircraft for Live Fire Test and Evaluation (LFT&E) oversight in May 1995 and approved the Test and Evaluation Master Plan in July 1999. Threats include man-portable air defense systems, surface-to-air missiles, anti-aircraft artillery, air-to-air missiles, rockets, and small arms. The C-130J LFT&E vulnerability reduction program addresses wing dry bay fire, composite propeller blade ballistic vulnerability, engine and engine bay fire, vulnerability to man-portable air defense systems threats, and mission-abort vulnerability.

TEST AND EVALUATION ACTIVITY



Due to system immaturity, operational testing was initially segmented into three phases: Phase 1A, Phase 1B, and Phase 2. Phase 1A evaluated the ability of the aircraft to train pilots. Phase 1B evaluated the aircraft's ability to perform the airland mission. Phase 2, planned for FY06, will evaluate all combat delivery capabilities, including airdrop using the Enhanced Cargo Handling System.

Block 5.4 modifications are now designated as the production representative version, with operational testing scheduled for early FY06. Block 6.0 will include Communications, Navigation, and Surveillance for Air Traffic Management (CNS/ATM) capabilities, while Block 7.0 is undefined at this time. Many documented deficiencies will not be corrected until Block 6.0 or 7.0.

There were no Vulnerability Reduction Program activities in FY04. The Air Force delivered the Vulnerability Reduction Program Phase II (Composite Propeller Vulnerability) Test Report to DOT&E in June 2004. Phase IV (Engine Nacelle Fire Extinguishing Evaluation) testing is scheduled for FY05.

TEST AND EVALUATION ASSESSMENT

C-130J

Major issues confronting the C-130J program include funding of logistics support and training systems; hardware, software, and technical order deficiencies; manufacturing quality; sub-system reliability; failure to meet required measures of system effectiveness and suitability; and resolution of documented deficiencies. A program for the correction of deficiencies is being worked.

Based on the evaluation of test results from Phase 1A and Phase 1B, the aircraft is not operationally effective. However, the Air Mobility Command has released a limited cargo carrying capability based on results from a command-initiated Force Development Evaluation. The airdrop mission cannot be evaluated until deficiency corrections are implemented and the developmental and operational tests are completed as planned in FY06.

Aircrew workload issues, software discrepancies, and cargo loading and constraint requirements are still major issues. Air Force users are unable to verify manpower requirements to field this system until the crew workload evaluation is complete. Army developmental and operational test and evaluation for airdrop of cargo and personnel are now scheduled using Block 5.4 hardware and software. Air Force operational test and evaluation requires the completion of Army testing prior to start.

DOT&E determined that the aircraft is not operationally suitable. Phase 1B reliability, maintainability, availability, and logistics supportability results failed to meet operational requirements and legacy standards. Deficiencies were noted with on-aircraft integrated diagnostics and fault isolation systems, portable maintenance aids, maintenance technical orders, and the availability of spare parts. Additional contractor field service representatives are required to assist in the maintenance of the aircraft for the foreseeable future.

DOT&E determined that testing of defensive systems has not demonstrated their effectiveness and suitability. An integrated system-level test is required to characterize system capability. However, the Air Force intends to deploy the C-130J to Central Command early in FY05, before the completion of IOT&E Phase II and the integrated defensive system test. Capabilities are limited to airland operations.

Phase II of the Live Fire Vulnerability Reduction Program showed that the C-130J composite propeller blades are not vulnerable to catastrophic threat-induced failure. Completion of Phase IV testing will conclude Vulnerability Reduction Program testing.

WC-130J

Three major issues confront the weather reconnaissance aircraft. They are the radar performance in the hurricane reconnaissance mission, propeller anti-ice protective cover peeling, and excessive vibration in the Drop Sonde Operator's station.

The low power color radar was designed as a weather-avoidance radar, but it was installed in the WC-130J to perform the weather penetration mission. The radar does not fully support operational requirements for the weather mission. The

program office has developed, but not fully funded, a spiral improvement plan to correct this critical deficiency. Developmental testing is being conducted, and if successful, operational testing will start in June 2006.

A proposed fix to the propeller problem has been installed on test aircraft. The fix must be tested in a hurricane environment, with some data being collected during the 2004 storm season. Integrated System Evaluations and combined developmental/operational test on the low power radar and propeller petal fixes are in progress. If the modifications are successful, then the next phase of OT&E can be performed on the WC-130J in storm season 2005.
A possible fix to the excessive vibration problem is included in the Block 5.4 upgrade. Operational testing is planned for Fall 2005.

Combat Survivor Evader Locator (CSEL) System

The hand-held radio uses line-of-sight UHF/VHF voice, rescue beacon, GPS, and over-the-horizon data modes for worldwide coverage.

SUMMARY

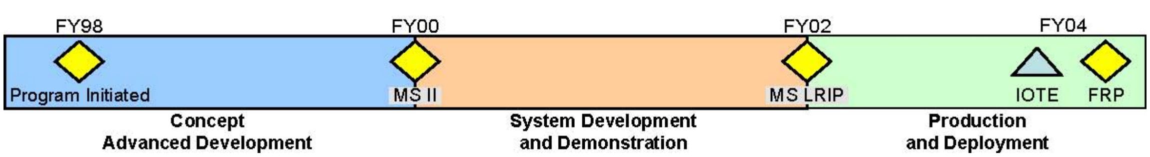
- In our beyond low-rate initial production report to Congress, we assessed the Combat Survivor Evader Locator (CSEL) multi-Service operational test and evaluation (MOT&E) adequate to determine the CSEL effective in notifying, locating, and authenticating survivor/evaders.
- CSEL was not suitable due to low rescue center-to-survivor message success rates, and supportability problems including inadequate training and less-than-required radio reliability.
- DOT&E also recommends follow-on operational testing to evaluate improvements in radio reliability and training, and operations employment improvements that could improve message success rate.

SYSTEM DESCRIPTION AND MISSION

The CSEL is a personnel locator system designed to provide survivor/evader location and a method for two-way communications between survivor/evaders and rescue forces. It enables command elements and search and rescue forces to locate and maintain contact with CSEL-equipped personnel. CSEL is a new type of survivor communication system that includes hand-held radios, unmanned base stations, and rescue center workstations. It uses UHF satellite communications, the Secret Internet Protocol Network (SIPRNET), national systems, Search and Rescue Satellite Aided Tracking system, and the Global Positioning System (GPS). The hand-held radio uses line-of-sight UHF/VHF voice, rescue beacon, GPS, and over-the-horizon data modes for worldwide coverage. The over-the-horizon segment includes four unattended UHF base stations that control satellite communication links with hand-held radios and interface with national assets, the Search and Rescue Satellite Aided Tracking system, and Joint Search and Rescue Centers via the SIPRNET.

CSEL also uses a new concept in rescue communications. A survivor sends a message with their GPS location (in a matter of minutes) via satellites to the appropriate rescue center. The centers can reply, authenticate the surviors' identity, or communicate additional messages with the survivor. The rescue centers also assign and coordinate rescue forces to speed recovery of the survivor. Once the rescue forces are within handheld radio range, they begin direct communication with the survivor to complete the recovery.

TEST AND EVALUATION ACTIVITY



CSEL MOT&E, completed in April 2004, conducted 91 recovery mission scenarios, day and night, in forested, desert, littoral, and open-ocean environments. The mission scenarios included 21 immediate recoveries, 14 pre-planned task force recoveries, and 56 unconventional assisted recoveries. The immediate recoveries simulated a rapid operation where recovery forces were readily available and already nearby. The pre-planned recoveries simulated a planned recovery operation from a central location. They used all available mission information to plan and implement the recovery using dedicated recovery forces. The unconventional assisted recoveries simulated a longer duration evasion, and used a wide range of forces (not just those typically used in recovery). These missions were scored as successes (the survivor was recovered) or failures (the survivor was not recovered due to inability to communicate or recover based on a CSEL failure).

TEST AND EVALUATION ASSESSMENT

CSEL is highly effective in communicating a survivor situation, providing precise location and authenticating the survivor's identity in approximately 5 minutes. CSEL is able to support survivor evasion and navigation, and provides voice capability to rescue forces. CSEL achieved an 82 percent mission success rate during MOT&E. If the developer and user address the problems identified in MOT&E, this rate could rise much higher.

CSEL was very effective at communications from the survivor to the rescue center (success rate 96 percent), but much less so with communications from the rescue center back to the survivor (success rate 58 percent).

The single greatest detractor from CSEL success was inadequate training. Several other supportability issues (such as determining an operational agency to manage the CSEL communications architecture) also contributed to DOT&E rating CSEL as "not suitable."

CSEL plans to conduct follow-on operational testing in FY05/FY06. This testing should prove improvements in radio construction and address those unmet communication requirements that CSEL implements in its next block increment. The program office is also attempting to find sufficient funds to develop a terminal area communication capability. This would allow rescue forces to receive a CSEL position directly without using voice as they approach the survivor. This capability exists with one other survivor radio, the "Hook" variant of a PRC-112. Users conducting MOT&E felt this is the most important capability CSEL should pursue. DOT&E supports this approach.

The Services have been purchasing Hook radios using operational funds, based on developer marketing. The Air Force last conducted operational testing of these radios in 1996; those radios did not include features used today. The Air Force is completing a utility evaluation of Hook survivor radios this fall, reporting on operational capability, limitations, and supportability. Initial assessment shows that training is a significant problem. O&M procurement and developer marketing is leading to a greater number of radio variants, which lead to training and supportability problems. There are a number of technical and usability issues with Hook radios, since they use commercial technology and do not incorporate DoD-mandated standards.

The Services should conduct follow-on operational testing that evaluates the updated CSEL, as well as the latest variant Hook radio. DOT&E believes a combination of Hook and CSEL radios will likely best meet user needs until Joint Tactical Radio System can be fully developed and fielded. Based on concerns with radio fielding and similar issues found between Hook and CSEL, DOT&E is nominating the Hook survivor radios for OSD oversight.

Distributed Common Ground/Surface Systems (DCGS)

SUMMARY

- Air Force Distributed Common Ground/Surface Systems (AF DCGS) has initiated development of Block 10.2. Current schedules reflect the Initial Operational Test and Evaluation (IOT&E) of AF DCGS Block 10.2 in 1QFY06.
- Army DCGS (DCGS-A) is preparing for Milestone B. Current schedules reflect the IOT&E of DCGS-A Increment 2 in 4QFY08.

The DoD DCGS is a family of 20 systems that receive, process, exploit, and disseminate intelligence in support of a Joint Force Commander.

SYSTEM DESCRIPTION AND MISSION

The DoD DCGS is a family of 20 systems — 19 of which are already in the field — that receive, process, exploit, and disseminate intelligence in support of a Joint Force Commander. DCGS objectives include receiving imagery at ground and surface systems from national and tactical sensors and exchanging intelligence between ground and surface systems using common components and compliance with Department of Defense standards. The Joint Chiefs of Staff-approved Capstone Requirements Document identifies the architectural requirements for the family of systems. The United States Joint Forces Command is the user representative for the family of systems. The AF DCGS and DCGS-A are both developing or are planning to develop new capabilities as block upgrades or increments.

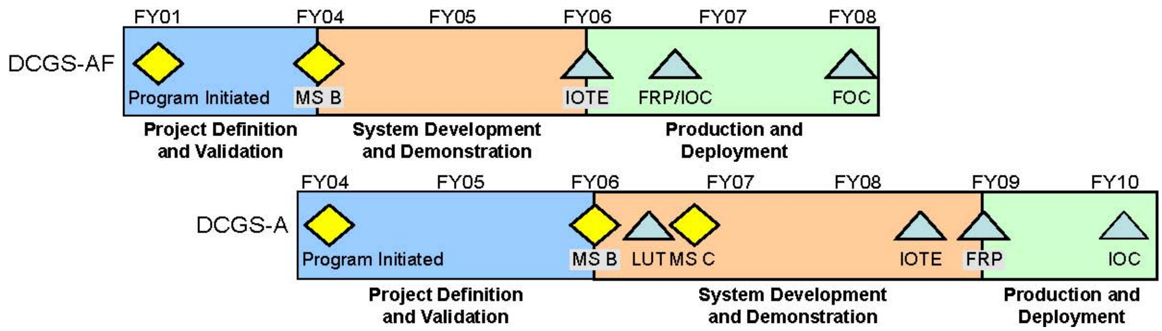
AF DCGS initiated the development of Block 10.2. The program office intends to conduct the IOT&E in 1QFY06. The Air Force expects to complete the documentation of capabilities for the future Block 20 by the end of FY04. The Army and Navy plan to adopt the AF DCGS Block 10.2 network infrastructure.

The DCGS-A is the Army's single integrated intelligence, surveillance, and reconnaissance ground processing system. There will be three types of DCGS-As: fixed, mobile, and embedded. Fixed DCGS-As will locate in rear, sanctuary locations such as a theater regional operations center. Mobile DCGS-As include single or multiple vehicles that operate with forward-deployed units. The embedded DCGS will be a software capability hosted on Future Combat System platforms, Aerial Common Sensor aircraft, and other platforms. The program is developing DCGS-A in two increments:

- Increment 1 integrates current force systems.
- Increment 2 is the objective system that will complement the Aerial Common Sensor and the Future Combat System.

The Army Test and Evaluation Command is responsible for the operational test and evaluation of DCGS-A. DCGS-A Increment 1 will not undergo operational testing; however, current program schedules show the IOT&E for DCGS-A Increment 2 in 4QFY08.

TEST AND EVALUATION ACTIVITY



The Joint Interoperability Test Command submitted the Capstone Test and Evaluation Master Plan for Service and Agency signatures.

The Joint Interoperability Test Command collected certification data for the Tactical Exploitation System and the Joint Service Imagery Processing System-Navy during the United States Joint Forces Command combined Joint Task Force Exercise 04-2 on the East Coast. The Joint Interoperability Test Command is preparing test reports for the interfaces tested.

The Air Force Operational Test and Evaluation Center resumed responsibility for the AF DCGS operational test and evaluation and completed an initial test design briefing for the IOT&E of AF DCGS Block 10.2.

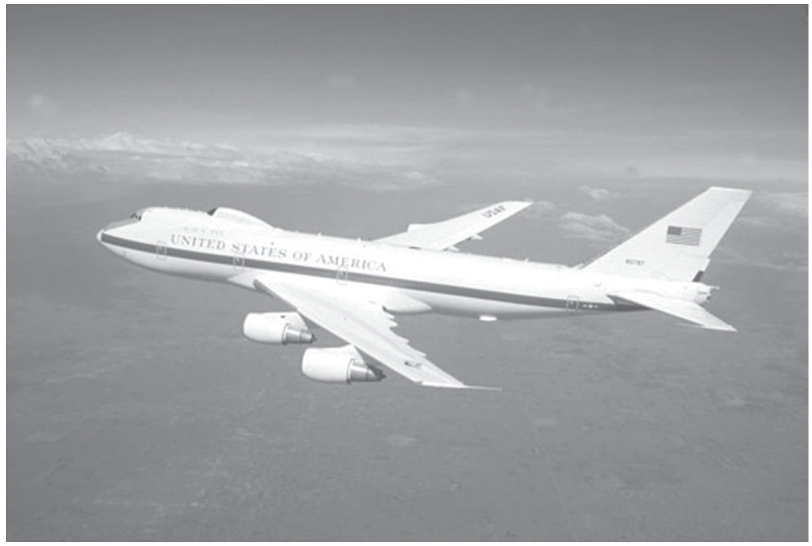
TEST AND EVALUATION ASSESSMENT

The Joint Interoperability Test Command established interoperability certification programs with 19 of the 20 systems that are members of the DCGS family, but only 5 of the 19 fielded systems have been granted interoperability certifications for some or all of their critical interfaces.

The combined Joint Task Force Exercise 04-2 provided the first opportunity to accomplish an operational assessment of a joint network of Service DCGS systems operating in accordance with a joint concept of operations. Lack of participation by all Services limited the assessment to interface certification.

The Air Force Operational Test and Evaluation Center initial test design has improved the likelihood of conducting an adequate IOT&E of AF DCGS Block 10.2 in FY06.

E-4B National Airborne Operations Center (NAOC)



The E-4B is a long-range aircraft with long endurance supported by an in-flight air refueling capability.

SUMMARY

- The E-4B National Airborne Operations Center (NAOC) System planned for testing is the Modification Block I. It consists of three major components: integration of the Global Air Traffic Management Phase II System, Audio Infrastructure Upgrade, and the Senior Leadership Communications System.
- This Acquisition Category III program did not have a declared Milestone A or B.
- The E-4B modernization program entered Engineering and Manufacturing Development during March 2000.
- Laboratory and ground-based aircraft developmental testing commenced during late FY04. The E-4B Operational Utility Evaluation will be in FY05. This test supports a full-rate production and fielding decision for the Block I modernization into the E-4B fleet.
- Major test and evaluation focus areas include adequacy of the integration, information assurance protection, onboard communications capability, and system-of-systems interoperability.

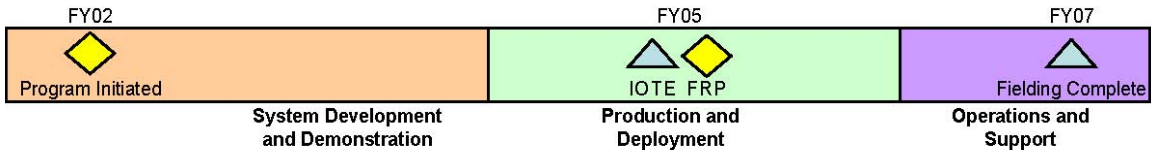
SYSTEM DESCRIPTION AND MISSION

The E-4B NAOC is a fleet of four militarized Boeing 747-200 aircraft that provides a survivable airborne national command post for senior leadership. The aircraft, based at Offutt Air Force Base, Nebraska, contain multiple and redundant secure national and strategic communications systems along with computerized workstations and databases. The E-4B is a long-range aircraft with long endurance supported by an in-flight air refueling capability.

The E-4B requires numerous improvements to maintain flight worthiness and improve command, control, and communications capabilities. The next near-term major improvement is Modification Block 1, which includes an Audio Infrastructure Upgrade, Global Air Traffic Management Phase II compliance improvements, and a new Senior Leadership Communications System.

The Audio Infrastructure Upgrade will provide an internal communications backbone through integration of a digital switch, multiplex systems, and a secure voice recording system. The Global Air Traffic Management Phase II modification will integrate a dual beyond line-of-sight data link capability and new displays and controls in the E-4B cockpit. The Senior Leadership Communications System will integrate a secure video teleconferencing and video broadcast reception capabilities in addition to new displays and controls.

TEST AND EVALUATION ACTIVITY



DOT&E reviewed a test concept to baseline current E-4B NAOC capabilities for those systems to be replaced by Block 1 modifications. This baseline will compare the performance of the appropriate Block 1 modification systems with legacy systems. An E-4B NAOC Modification Block I Integrated Test Team submitted the Test and Evaluation Master Plan to DOT&E for approval in July 2004. The Air Force provided DOT&E with a draft Operational Test Concept in February 2004.

- The operational test will feature more robust testing of beyond-the-horizon communications capabilities provided by the Block I modification, as well as verifying legacy communications capabilities. The operational test will include a joint interoperability evaluation by the Joint Interoperability Test Command.
- The operational test will focus testing on the Information Assurance vulnerabilities introduced by the Block I modifications, particularly the Global Air Traffic Management integration.

Completion of the integration of a prototype Block 1 Modification kit is underway in the laboratory. The E-4B aircraft inducted during November 2004 is completing installation of the Block I kit (installation of wiring, movement of equipment).

TEST AND EVALUATION ASSESSMENT

A previous E-4B modification effort to automate the computerized displays and data storage was unsuccessful. The Block 1 Modification test planning process will identify appropriate test events for early insight into developmental maturity and identify risks to a successful Operational Utility Evaluation.

The principal technical risk to the Modernization Block I program is the content of the system architecture and the integration of a large number of commercial off-the-shelf and modified off-the-shelf items into that architecture.

The E-4B platform's Joint interoperability Information Exchange Requirements are not complete, nor is the Information System Support Plan. The Integrated Test Team collaboratively developed the Information Exchange Requirements and they will be included in the test plan for approval.

The prototype Block I kit and installation into the E-4B may not be production representative. Before operational requirements are completed, follow-on testing to verify performance of the production kit is required. The integration contractor, Boeing, is also the developmental tester. Boeing's participation in the Integrated Test Team has improved test planning and provided visibility into both developmental and operational test planning.

Close adherence to the schedule is required for the test E-4B modification aircraft to take advantage of two major exercises involving the E-4B. Participation in these exercises by the Block I modified E-4B and a baseline E-4B will provide key comparison data to determine the operational effectiveness and operational suitability of the Block I modified E-4B.

E-10A Multi-Sensor Command and Control Aircraft

SUMMARY

- The E-10A will provide simultaneous air and surface command and control intelligence, surveillance, and reconnaissance support and targeting information to all the Services.
- Testing the E-10A's ability to conduct multiple missions simultaneously will present significant challenges.
- The E-10A program is critically dependent on several programs including: Multi-Platform Radar Technology Insertion Program (MP-RTIP) and Multi-Platform Common Data Link (MP-CDL). The difficulty in integrating these capabilities must not be underestimated.

The E-10A will meet the Air Force's need for integration of command and control, intelligence, surveillance, and reconnaissance, and Information Warfare functions on a single platform.

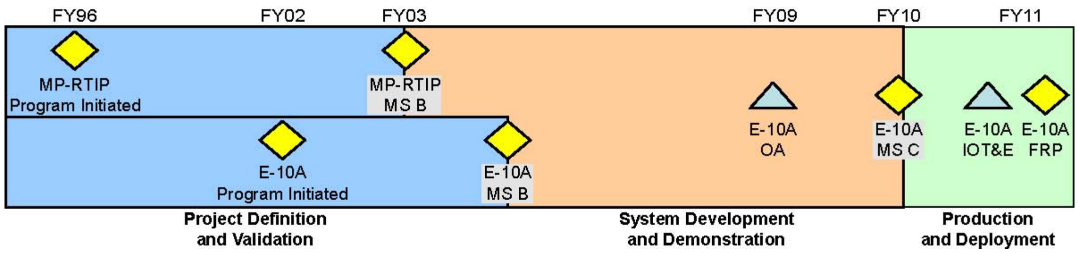
SYSTEM DESCRIPTION AND MISSION

The E-10A will meet the Air Force's need for integration of command and control, intelligence, surveillance, and reconnaissance, and Information Warfare functions on a single platform. Integration of these functions will improve the effectiveness of military operations through information superiority by supporting rapid decision analysis, increased battlespace awareness, and shortened decision cycles. The initial E-10A capability will include the MP-RTIP sensor and Battle Management Command and Control suite enabled by an open-system architecture. The sensor will support a cruise missile provide Ground Moving Target Indicator and Synthetic Aperture Radar capabilities. The MP-CDL will provide the data link to other airborne and ground platforms conducting the ground war. Other capabilities will include interfaces to Space-Based Radar; reception of the data from, and control of, unmanned aerial vehicles; and combat operations functions. The initial effort will include both hardware and software growth provisions to permit incorporation of additional sensor configurations, as well as other Battle Management Command and Control and functionality for future developments. The Air Force is tentatively planning additional spirals to expand the E-10A support to air warfare and cruise missile defense with additional sensors (e.g., Identification, Friend or Foe, and additional Battle Management Command and Control functionality).

The E-10A evolved from the Block 40 upgrade of the Joint Surveillance Target Attack Radar System E-8C (Boeing-707), designated the Radar Technology Insertion Program (RTIP). The Air Force restructured RTIP as MP-RTIP and the Office of the Secretary of Defense directed the program office to develop a scalable sensor for multiple platforms. An Analysis of Alternatives has been conducted to determine on which aircraft to install the sensor (the Boeing-707 or a newer aircraft). Using this analysis, the Air Force decided the B-767-400ER best suited the needed capability and growth. After the aircraft selection, the Air Force further decided to integrate the MP-RTIP onto the E-10A.

The E-10A program is critically dependent on the MP-RTIP and several government-furnished equipment communications programs, including MP-CDL. The MP-RTIP provides the primary sensor for the E-10A. Those programs participate in the Extended Program Execution Team to provide all programs' visibility into each other's schedules.

TEST AND EVALUATION ACTIVITY



The E-10A program is modifying the test strategy developed by the E-8D RTIP program to support the broader mission and requirements of E-10A. The E-10A Integrated Test Team is writing a Test and Evaluation Master Plan for the E-10A, including the MP-RTIP sensor. The Air Force is no longer planning to staff the Test and Evaluation Master Plan through the Army before submitting to the Office of the Secretary of Defense. The Air Force Operational Test and Evaluation Center is planning an Early Operational Assessment to support the E-10A Milestone B in FY05.

There were no live fire test activities conducted in FY04. The Air Force is currently developing the Live Fire Test Alternative Plan.

TEST AND EVALUATION ASSESSMENT

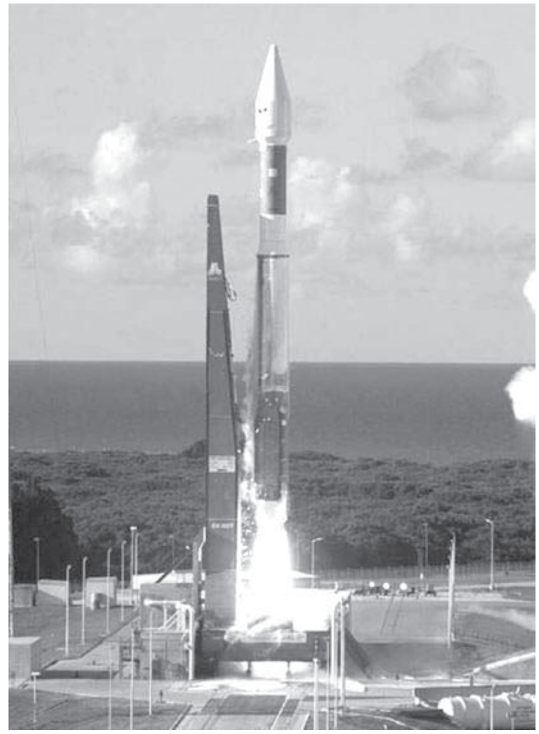
Early attention towards understanding significant testing challenges is critical. The E-10A will provide simultaneous air and surface command and control intelligence, surveillance, and reconnaissance support and targeting information to all the Services. It will require a high degree of joint interoperability for both ground combat and air defense missions. Demonstrating the ability to support the simultaneous prosecution of the air and surface wars will require carefully planned field tests augmented by modeling and simulation. Development and testing will demand an unprecedented level of joint cooperation.

There is risk associated with the integration of two Acquisition Category 1D programs (E-10A and MP-RTIP) and the MP-CDL. The E-10A is dependent on MP-RTIP to deliver its primary sensor. MP-RTIP is dependent on E-10A to provide a test platform for the sensor and the MP-CDL to serve as the pipeline for radar data to the users. The Air Force must closely coordinate the planned delivery of these three programs to ensure no part of the overall system has to wait for the delivery of the others. Due to the scope and the long lead-times required for these programs, such delays will significantly increase technical integration and costs.

Evolved Expandable Launch Vehicle (EELV)

SUMMARY

- The Boeing Heavy Launch Vehicle launch is the next major program event, planned for early FY05.
- The new Test and Evaluation Master Plan is currently in development.
- DOT&E's Post Operational Assessment evaluation effort has begun.



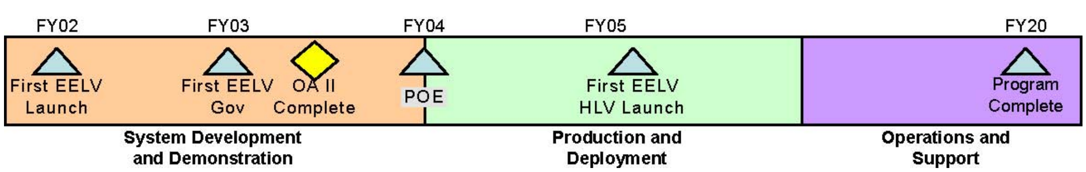
The EELV program fulfills government satellite launch requirements currently served by Delta II, Atlas II, Titan II, and Titan IV.

SYSTEM DESCRIPTION AND MISSION

The Evolved Expendable Launch Vehicle (EELV) program fulfills government satellite launch requirements currently served by Delta II, Atlas II, Titan II, and Titan IV. The EELV will be DoD's only medium, intermediate, and heavy payload space launch capability after current heritage inventories are exhausted. FY03 marked the transition to the new launch vehicle, which should provide launch services through 2020. Boeing's EELV family of launch vehicles is designated the Delta IV, and Lockheed Martin's family the Atlas V. DoD will acquire launch services from these contractors. Production and launch operations responsibilities, as well as ownership of all EELV flight hardware and launch pad structures, will remain with the system contractor. DoD will lease launch pad real property and other on-base facilities required for operations to the contractors.

The system contractors shared development costs with the government to satisfy both DoD civil launch requirements and commercial launch needs. The EELV system includes launch vehicles, infrastructure, support systems, and interfaces. The system is standardizing payload interfaces, launch pads, and the infrastructure so that all configurations of each contractor's EELV family can be launched from the same pad and payloads can be interchanged between vehicles in the same class (i.e., medium, intermediate, or heavy). The EELV program will maintain current mass-to-orbit capability while increasing launch rate and decreasing costs.

TEST AND EVALUATION ACTIVITY



DOT&E participated in Test Integrated Product Team meetings, with the goal of updating the September 1998 Test and Evaluation Master Plan and ensuring critical documentation and data are available for independent review and analysis. The WDR #1 for the Delta IV Heavy Launch Vehicle took place in August 2004. The second WDR occurred in October 2004. DOT&E plans to observe this test event in preparation for the Heavy Launch Vehicle launch scheduled to occur by year's end.

TEST AND EVALUATION ASSESSMENT

There do not appear to be any insurmountable problem areas affecting the EELV program. Both the Atlas V and Delta IV boosters have launched successfully (three times each, all prior to FY04). Further, both contractors' vehicles have successfully flown with solid boosters strapped to the main booster.

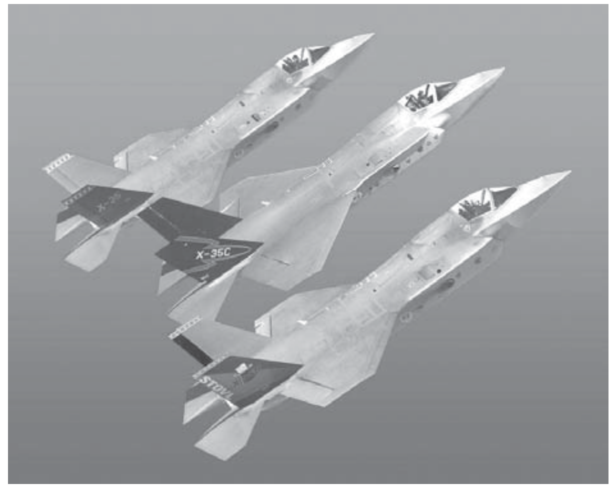
The Air Force Test and Evaluation Center completed OA-II in December 2002, and found the system to be a potentially effective and potentially suitable launch service that can support the requirements of the National Launch Forecast. Since OA-II marked the end of the Air Force Test and Evaluation Center's EELV test program involvement, DOT&E arranged for additional system performance analysis through a detailed test strategy laid out in the latest draft version of the Test and Evaluation Master Plan. Specifically, DOT&E will participate in a final operational test phase that will encompass several launches presently planned for each contractor, and should include medium launch vehicles, heavy lift vehicles, and East Coast and West Coast launches. This final phase of operational testing is the post-OA-II operational evaluation.

This post-OA-II operational evaluation concept relies extensively on combined developmental/operational testing. The test strategy also includes intensive use of models and simulations to predict individual subsystem and total system performance. The government needs to focus system effectiveness and suitability assessments in terms of how well the system can perform on various DoD missions. The current schedule includes post-OA-II operational evaluation events through October 2005.

F-35 Joint Strike Fighter (JSF)

SUMMARY

- The F-35 Joint Strike Fighter (JSF) meets all the Services' needs for a strike fighter aircraft with a family of common aircraft. The three variants of this aircraft are:
  - Conventional Takeoff and Landing
  - Aircraft Carrier Suitable
  - Short Takeoff and Vertical Landing (STOVL)
- JSF will be capable of striking and destroying a broad range of targets, day or night, in adverse weather conditions. These targets include fixed and mobile land targets, enemy surface units at sea, and air threats ashore and at sea including anti-ship and land attack cruise missiles.
- The program has spent the last year on efforts to reduce the aircraft weight and ensure the viability of the STOVL design.
- The impact of the loss of commonality between the three variants, resulting from the weight reduction efforts, will require an increase in the scope of the flight test effort and will require a revision to the current Test and Evaluation Master Plan (TEMP).



The program has spent the last year on efforts to reduce the aircraft weight and ensure the viability of the STOVL design.

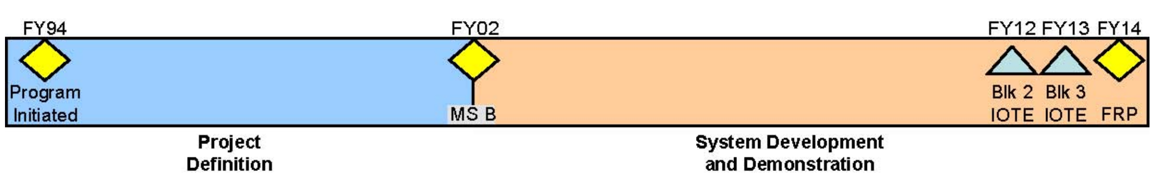
SYSTEM DESCRIPTION AND MISSION

JSF is a joint, multi-national program for the U.S. Air Force, U.S. Navy, U.S. Marine Corps, and eight cooperative international partners: the United Kingdom, Italy, the Netherlands, Turkey, Canada, Australia, Denmark, and Norway. This family of strike aircraft will consist of three variants: conventional takeoff and landing; aircraft carrier suitable; and STOVL.

The System Development and Demonstration (SDD) phase is a block program to develop, acquire, and test the JSF in a series of upgrades. To accommodate the phased integration of capabilities and functionality, the Integrated Test Force and the operational test agencies will test interim blocks. As the SDD phase progresses, the users will develop requirements for additional capabilities for future block upgrades to respond to new threats.

Biennial operational assessments (OAs) will determine potential operational effectiveness and suitability with a focus on programmatic voids, areas of risk, testability of requirements, significant trends in development efforts, and the ultimate ability of the program to support an adequate period of evaluation during the dedicated operational test and evaluation of Blocks 2 and 3. OAs will not replace the independent period of dedicated operational testing necessary to support a full-rate production.

TEST AND EVALUATION ACTIVITY



The Air Force Operational Test and Evaluation Center and the Navy's Operational Test and Evaluation Force conducted an OA of JSF and issued a report on their findings in mid-2004. This OA was the first in a series of five planned during the SDD phase. Although a limited amount of new data were available because of the redesign efforts, the report found that the JSF program is making satisfactory progress toward being an effective and suitable system. However, the following areas require attention:

- The base and ship infrastructure were not designed for the JSF security-operating environment. The JSF Program Office (JPO) and the Services are working to mitigate impacts.
- The JSF concept of operations requires performance in very hot climates. The predicted air vehicle thermal output in this environment will cause significantly degraded performance.
- JSF users have a requirement for future growth in the areas of power, volume, and cooling. Future growth allocations are in jeopardy for all three areas. The initial design requires excess capability in order to meet future requirements.

Insight from Live Fire Test and Evaluation (LFT&E) tests conducted during FY04 is part of the design effort.

TEST AND EVALUATION ASSESSMENT

This past year the JPO has focused on reducing the aircraft's vehicle weight. Aircraft weight is not a key performance parameter. However, weight reduction for the STOVL variant is critical to satisfy performance requirements. The Conventional Takeoff and Landing and Aircraft Carrier Suitable variants will benefit from weight reductions, but the current designs are low risk to satisfy key performance parameters. The JSF Program Office assesses that approximately 3,500 pounds of weight reduction is required for the STOVL variant in order to satisfy all key performance parameters. By the end of FY04, the JPO achieved approximately 2,700 pounds of weight savings/offsets through a three-step process.

- First, a STOVL variant weight attack team explored weight-savings design ideas. The most significant design change was a return to a thousand-pound weapon-capable bay.
- Second, the JPO made changes to the operating ground rules and assumptions for verifying requirements. These changes include reserve fuel requirements, ship landing patterns, and wave-off procedures.
- Third, the JPO conducted an analysis of requirements to determine where relief is prudent to balance warfighting needs and design realities. The most significant relief is a change to the mission profile to mirror that of the U.S. Navy's high altitude profile. Adopting the U. S. Navy profile permits the STOVL aircraft to satisfy the flat deck takeoff and range key performance parameters with a fuel weight 1,700 pounds less than the fuel capacity of the aircraft.

The STOVL weight reduction target of 3,500 pounds is optimistic.

- The JPO is utilizing a weight growth of three-percent during the SDD phase. DOT&E's weight threat assessment uses a six-percent growth value.
- DOT&E assesses there is an additional 800 to 1,000 pound threat to the STOVL design associated primarily with the difference in weight growth assumptions.
- Additionally, the cost to Force providers and warfighters of light-loading the STOVL aircraft with 1,700 pounds less fuel has yet to be determined.

DOT&E assesses the STOVL design is viable for the U.S. Air Force requirement for a short takeoff capability, but sees significant risk remaining in satisfying the U.S. Marine Corps shipboard operations requirements. The JPO must continue to reduce the weight of the STOVL design and should reassess their weight growth assumptions.

Another risk to the JSF program is the software development. The JSF requires an unprecedented amount of software. Block 3 delivers the majority of the capability. The slope of the learning curve and efficiencies required to execute Block 3 software development exceeds previous software development programs.

The scope of the flight test effort in the approved TEMP was acceptable when a high degree of commonality existed between the three variants. The weight reduction efforts have reduced the commonality between the variants - particularly in the area of weapons separation testing. The flight test program will have to grow to accommodate the new schedule and loss of commonality.

F/A-22 Advanced Tactical Fighter

The IOT&E began in late April 2004 with four OT&E aircraft.

SUMMARY

- The F/A-22 program completed the operational test and evaluation (OT&E) Phase 1 operational assessment in February 2004 and began the Initial OT&E (IOT&E) in April 2004.
- The Air Force executed the open air trials and Air Combat Simulator trials outlined in the test plan between April and September 2004.
- To complete IOT&E, the Air Force must complete four end-to-end operational test missile firings and several modeling and simulation evaluations for operational effectiveness and suitability.
- DOT&E continues to analyze available open-air trials, supplemental flight evaluations, and modeling results.
- The Air Force completed the live fire test program in 2004.
- DOT&E will complete a beyond low-rate initial production report, including the live fire report, before the full-rate production decision planned in early 2005.

SYSTEM DESCRIPTION AND MISSION

The Air Force intends the F/A-22 to provide air dominance with improved capability over current U.S. Air Force combat aircraft. The F/A-22 must have improved lethality to ensure first-look/first-kill in all environments, and maneuverability and acceleration to ensure superiority over any known or predicted threat in the close-in fight. It must have the survivability to conduct its air superiority mission over enemy territory. The system is to accomplish this through a balanced combination of supersonic cruise (without afterburner), low observability, tailored countermeasures, and maneuverability. It must fight in all weather, day or night, over the land or sea. The F/A-22 systems must provide the pilot significantly improved beyond-visual-range situational awareness using highly integrated offensive and defensive functions. Another major requirement for the F/A-22 is a reduction in manpower and equipment supportability through improved reliability, maintainability, and onboard support systems.

Other features critical to the F/A-22 concept of operations are:

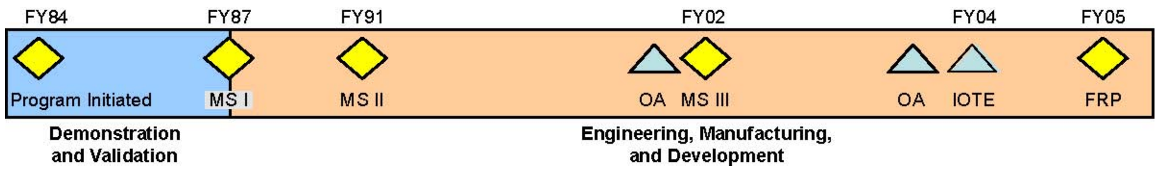
- An integrated avionics suite incorporating offensive and defensive sensors; an electronically scanned, active element radar array; and an advanced electronic warfare system with a variety of identification and countermeasures capabilities.
- A cockpit designed to exploit the capabilities of these advanced systems without overwhelming the pilot.
- Enhanced logistics features include an Integrated Maintenance Information System and advanced Diagnostics and Health Management to achieve reduced maintenance manpower and improved deployability.

Basic armament consists of six AIM-120C radar-guided air-to-air missiles, two AIM-9M infrared guided missiles, and a

20 mm cannon. Alternatively, the Air Force intends the F/A-22 to internally carry two 1,000-pound Joint Direct Attack Munition precision-guided bombs with two AIM-120s and two AIM-9Ms.

Lockheed Martin is the prime contractor for the F/A-22 with significant involvement from Boeing Military Aircraft for mission software development, avionics integration laboratory, flying test bed, and manufacturing. Pratt and Whitney is the prime contractor for the F119 engines.

TEST AND EVALUATION ACTIVITY



In August 2003, The Air Force Operational Test and Evaluation Center (AFOTEC) revised the IOT&E test plan and included an operational assessment called OT&E Phase 1. OT&E Phase 1 established a baseline for performance of the F/A-22 prior to IOT&E. OT&E Phase 1 documented what worked, what did not work, and enabled recommendations for fixes or improvements needed for combat prior to the start of IOT&E. AFOTEC conducted OT&E Phase 1 between October 2003 and February 2004 on the Nellis Test and Training Range. It consisted of single- and two-ship open-air trials. AFOTEC used three OT&E aircraft configured with avionics software Block 3.1.2 Flight Test-3.2 and 3.3. AFOTEC operated aircraft within an interim flight envelope, detailed in the November 2003 Modified Flight Manual.

In March 2004, the test team conducted F-15C comparison test trials as part of the IOT&E. These trials used two Offensive Counter-Air scenarios – High Value Airborne Asset-Attack and Force Protection (with one B-2 as the strike aircraft). Both scenarios included two blue fighters and four red airborne interceptors (i.e., 2v4). The test team completed 22 valid open-air trials in addition to 26 first-look-first-kill (1v1) trials.

In April 2004, the Joint Requirements Oversight Council validated interim thresholds for suitability parameters to be met in IOT&E. The Air Force stated that, if these interim values are met, then the aircraft might be on track to meet mature thresholds. The measures are sortie generation rate, mean time between maintenance, and airlift support.

The program office, test team, and the Office of the Secretary of Defense closely tracked a measure of avionics stability (mean time between avionics anomalies) throughout the year in order to assess the growth in avionics maturity and to use as an indicator of system readiness to enter IOT&E. The data for the mean time between avionics anomalies metric came from Aircraft 4006 (the contractor-maintained aircraft used as an avionics stability test bed), as well as the four OT&E aircraft.

The integrated contractor and test team completed safe separation unguided missile launches with AIM-9M and AIM-120C missiles throughout the F/A-22 flight envelope. Testing of AIM-120C separation under rolling conditions, as well as air-to-ground weapon and wing tank separation testing, is under way. The Air Force completed 13 of 17 planned end-to-end guided missile launches. Three of the remaining launches are subsequent attempts after failures occurred in first attempts at the given scenario.

The IOT&E began in late April 2004 with the four OT&E aircraft and a spare aircraft (a joint developmental test/operational test aircraft that is fully contractor maintained). Based on OT&E Phase 1 performance, the contractor updated these aircraft with avionics software Block 3.1.2 Flight Test-3.6.1 prior to the start of the test. The test team added a fifth operational test aircraft late in July. During the first six weeks, the F/A-22 flew comparison test open-air trials similar to those flown by the F-15C and completed a total of 25 (2v4) trials and 24 first-look-first-kill (1v1) trials. During the next six weeks, the F/A-22 flew two additional scenarios; these were Defensive Counter-Air High Value Airborne Assest-Protect and Offensive Counter-Air Force Protection (with four F-117s as the strike aircraft). Both of these scenarios included four blue fighters and eight red airborne interceptors (4v8). The test team completed 23 (4v8)

trials. Additionally, the test team conducted supplemental missions to provide information on system effectiveness under conditions that could not be included in the open-air trials. The F/A-22 flew approximately 60 supplemental sorties including the mission areas of night-time, live gun firings, advanced infrared threats, advanced electronic countermeasure threats, low altitudes, and high signal density.

The test team conducted a sortie surge demonstration as part of the IOT&E. The approved test plan called for a five-day four-aircraft exercise to generate 24 F/A-22 sorties within five days. AFOTEC conducted the five-day event in two parts, the first two days took place at the end of June and the last three days took place in early August. In the first two days, AFOTEC intended to demonstrate short sortie durations with high sortie rate. The last three days demonstrated a long sortie duration with lower sortie rate.

The test team conducted the final phase of IOT&E in the F/A-22 Air Combat Simulator with approximately seven weeks of trials against current and advanced threats. The Air Combat Simulator simulates a dense surface-to-air and air-to-air threat and electronic signal environment that is not possible in open-air trials.

The program office and test team began planning for the F/A-22 follow-on operational test and evaluation (FOT&E). The FOT&E will evaluate air-to-ground mission capability, as well as fully expand the F/A-22 air-to-air capability to include evaluation of its capability in a cruise missile defense environment. The Air Force must submit a FOT&E Test and Evaluation Master Plan for Office of the Secretary of Defense approval in conjunction with the full-rate production.

The Air Force completed live fire testing of the Onboard Inert Gas Generator System in FY04. Fuel tank tests, conducted in the contractor flight simulator system facility, measured oxygen concentrations during several simulated high-altitude mission profiles.

TEST AND EVALUATION ASSESSMENT

OT&E Phase 1 established a performance baseline, which the developer, tester, and user determined was adequate for combat operations in the limited operational environment made available in the open-air trials. Inadequate technical order data and an immature Integrated Maintenance Information System prevented the collection of meaningful maintainability data, and maintenance issues hampered the sortie generation rate. AFOTEC documented system deficiencies that affected performance and identified 25 problems that needed to be addressed prior to entry into IOT&E. The fixes primarily involved sortie generation rate, mean time between avionics anomalies, chaff and flare countermeasure reliability, and identification performance.

The end-to-end missile shots against realistic targets will provide a critical validation of the F/A-22 air-to-air capability.

The Onboard Inert Gas Generator System successfully maintained fuel tank ullage oxygen concentration levels well below those necessary to support fire or explosion. This testing completes the F/A-22 alternative live fire test program. The DOT&E will combine the live fire test and evaluation results with the operational test results in the beyond low-rate initial production report.

Global Broadcast Service (GBS)

SUMMARY

- The Global Broadcast Service (GBS) system demonstrated basic capability for simultaneous broadcast in both asynchronous transfer mode (ATM) and internet protocol (IP) formats. This is a requirement of Naval Forces and assigned military users during the transition from ATM to IP.
- ATM equipment is operating effectively. The program office committed to ATM logistic support and broadcast until the transition to IP equipment is complete.
- Tactical Receive Suites are transportable, easy to set up, and meet basic reception requirements.
- System demonstrated interoperability between two different crypto units, both following High Assurance Internet Protocol Interoperability Specification.
- The program is committed to a very aggressive development effort to support a beyond low-rate initial production decision prior to FY06.

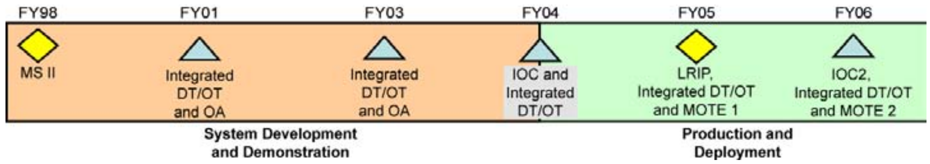
GBS consists of a space segment, fixed and transportable transmit suites, and fixed and transportable receive suites.

SYSTEM DESCRIPTION AND MISSION

GBS will augment and interface with other communications systems. It will provide a continuous, high-speed, one-way flow of high-volume data, audio, imagery, and video information streams at multiple classification levels to deployed and garrisoned forces across the globe. GBS consists of a space segment, fixed and transportable transmit suites, and fixed and transportable receive suites. The space segment of the current phase of GBS consists of four GBS transponders on each of three Ultra High Frequency follow-on satellites and leased commercial satellite transponders as required to meet demand. Transmit suites build broadcast data streams from various sources of information, including command, weather, and intelligence agencies and airborne observation platforms. They manage the flow of selected information through the uplink broadcast antenna to the orbiting satellites for broadcast to the appropriate theaters of operation. The receive suites extract the appropriate information for distribution by existing systems to the appropriate end users within selected areas of operation.

In 2004, the GBS program followed a major shift in the direction of commercial technology from ATM equipment with customized government application software to commercial off-the-shelf IP-based equipment. In addition to being more affordable and supportable, the commercial off-the-shelf IP-based architecture is also far more capable of providing the deferred Operational Requirements Document capabilities. The shift to IP occurred, however, as the Services were gearing up for their production buys starting in 2004. The Combined Test Force has worked with the system program office to support an aggressive combined developmental test/operational test program leading up to an initial Multi-Service Operational Test and Evaluation (MOT&E) in 2005, in time to support a 2005 beyond low-rate initial production acquisition decision. Because of the aggressive schedule, this MOT&E will not be able to test all terminal types and demonstrate all the deferred Operational Requirements Document capabilities. Therefore, a follow-on MOT&E at the beginning of 2006 will provide the Initial Operational Capability 2/3 declaration.

TEST AND EVALUATION ACTIVITY



There were three primary government test events in FY04, each with increasing functionality, complexity, and operational realism. In December 2003, the basic functionality of the commercial off-the-shelf receive suites was tested using commercial off-the-shelf broadcast software and a broadcast generated at the contractor system integration laboratory. The receive suite hardware was similar to the production representative system and did not have crypto equipment. This test identified several issues for resolution and provided sufficient confidence to buy the initial test units.

In March 2004, the test was repeated with production representative receive suites, except that the cryptographic equipment was not production representative. The broadcast, run from Wahiawa, Hawaii, used an early version of the government broadcast software, demonstrated end-to-end functionality, and supported the purchase of the low-rate production IP receive suites.

In July 2004, following the National Security Agency certification of the production cryptographic equipment, a third test sequence demonstrated full end-to-end performance, with a fully production representative system. The test also demonstrated a simultaneous broadcast of data in both the ATM and IP formats and the ease with which the tactical receive suites can be set up.

TEST AND EVALUATION ASSESSMENT

The GBS system has made substantial progress from its very elementary capability to a system that played a substantial role in information distribution during both Operation Iraqi Freedom and Operation Enduring Freedom. The incremental integrated developmental test/operational test strategy has worked in concert with the incremental fielding and evolutionary release of software builds to effectively bring the system to its present condition. Testing performed during FY02 and FY03 supported the Initial Operational Capability 1 declaration and Navy baseline of its ATM equipment while identifying the issues that remain to be solved.

Performance of ATM equipment. The ATM equipment is effective except for deferred requirements. It is suitable except for reliability of Navy shipboard receive suites. Product reception rates were 96 percent for unclassified data, 93 percent for classified data, and 100 percent for video products – both classified and unclassified. Spot beam control was successful for 100 percent of the requested moves within an average of six minutes. From an operational perspective, the Theater Informational Managers have become integrated into the process. Except as noted, overall reliability, availability, and maintainability is good. The Navy receive suites continue to have a low mean time between operational mean failure. In addition, antenna blockage due to superstructure and other antennas is a Navy-unique problem. Large deck ships with dual antennas have blockage up to 60 degrees and submarines have a blockage from the main periscope of 30 degrees.

Preliminary Performance of the IP Equipment. Preliminary results from the testing conducted in FY04 indicate that the IP system is potentially effective and suitable. The new tactical receive suites meet the transportability and weight requirements and can be easily set up in 10 to 15 minutes by an experienced technician – well below the 30 minute requirement. There are numerous issues to be resolved, but the system appears to be capable of meeting the required operational availability and reception rates. Simultaneous broadcast of both ATM and IP formats has been demonstrated but is not yet in the final configuration that will allow greater dynamic allocation of bandwidth. Reliability and maintainability data are not yet available.

Global Command and Control System - Air Force (GCCS-AF)

SUMMARY

- Two operational tests of the new Joint Operational Planning and Execution System, together with the Deliberate and Crisis Action Planning and Execution System (DCAPES), revealed shortcomings in database synchronization, overall system performance, and interoperability.
- Tests of the Theater Battle Management Control System (TBMCS) Unit-level Operations (UL-Ops) and Unit-level Intelligence (UL-Intel) Spiral 8 software were successfully tested and fielded.
- After two developmental tests, February 2005 is the planned operational test for TBMCS Force-level 1.1.3.

GCCS-AF has the capability to plan and execute air operations at the operational level.

SYSTEM DESCRIPTION AND MISSION

The Global Command & Control System – Air Force (GCCS-AF) is a secure, interoperable core command and control constellation. It has the capability to plan and execute air operations at the operational level. In FY04, GCCS-AF included TBMCS, DCAPES, the Joint Defensive Planner, Joint Targeting Toolbox, Time Critical Targeting Functionality, Web Enabled Execution Management Capability, and the Joint Environmental Toolkit. The management of GCCS-AF will be a portfolio of programs.

TBMCS is the key component of the five Air Operations Centers, called Falconers. They are under the configuration management of the Air Operations Center–Weapon System program. Other GCCS-AF systems also fielded to the Falconers include the Joint Defensive Planner, Joint Targeting Toolbox, Time Critical Targeting Functionality, Web Enabled Execution Management Capability, and the Joint Environmental Toolkit. TBMCS provides hardware, software, and communications interfaces to support the preparation, modification, and dissemination of the force-level Air Battle Plan. It includes the air tasking order and airspace control order. TBMCS unit-level operations and intelligence applications provide Air Force Wings the capability to receive the Air Battle Plan, parse it, and manage wing operations and intelligence to support its execution. TBMCS supports the development and sharing of a common, relevant operational picture of theater air and surface activity.

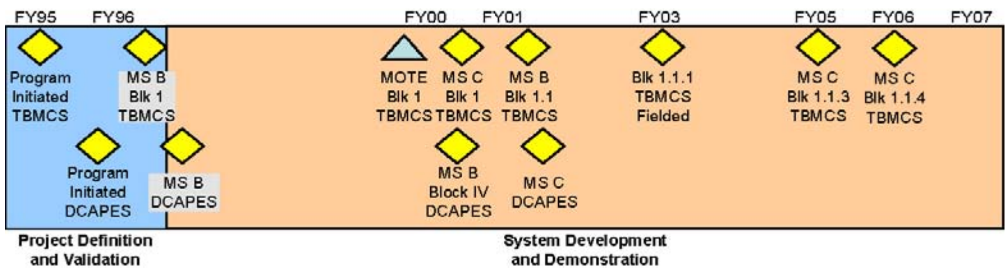
The TBMCS intelligence and targeting applications at the theater Joint Force Air Component Commander-level support the Air Support Operations Center and Direct Air Support Center. It supports the coordination of Precision Engagement fires, safe passage zones, and near real-time warnings of impending air attack. The air and surface surveillance and weapons coordination engagement options enable synchronized operations and employment of the correct weapons for each target to generate the desired results. All TBMCS network participants, contributing to improved decision-making by commanders, share engagement intentions and results assessments. TBMCS fielding includes every theater air component, all Navy aircraft carriers and command ships, all Marine Air Wings and Air Force flying wings, and Air Support Operations Center squadrons. The Army Battlefield Coordination Detachments also interface with TBMCS.

The TBMCS program has made significant improvements. It is now compliant with the acquisition requirements for Major Automated Information Systems. Coordination among the Services for defining Service-unique requirements has

improved. The Service Operational Test Agencies continue to work well together on this program. Previously assessed as effective and suitable, TBMCS 1.1 and 1.1.1 versions, are executing well in the field.

DCAPES is the Air Force feeder system to the Joint Operational Planning and Execution System. It provides Air Force user's access to the Joint Operational Planning and Execution System at the numbered Air Force and higher echelons for support of Time-Phased Force Deployment Document. It provides manpower, personnel, and logistics data for operations planning.

TEST AND EVALUATION ACTIVITY



- TBMCS UL-Intel Spiral 8 Field Development Evaluation (FDE), March-April 2004.
- TBMCS UL-OPS Spiral 8 FDE, October 2004.
- TBMCS 1.1.3 Force-level developmental testing (in conjunction with Air Operations Center–Weapon System 10.1), May-June, October 2004.
- DCAPES operational testing (in conjunction with GCCS-Joint 4.0(a) operational testing), January 2004.
- DCAPES operational testing (in conjunction with GCCS-Joint 4.0(a) operational testing), June 2004.

TEST AND EVALUATION ASSESSMENT

TBMCS UL-Intel involved the Air Force Communications Agency early in the testing cycle. They ensured all important security issues were resolved early. During spiral 8, this approach worked well. The system is effective, suitable, and fielded.

TBMCS UL-OPS Spiral 8 experienced delays. Software immaturity discovered during early in-plant testing delayed Spiral 8 developmental testing to July 2004. Operational testing was conducted October 2004.

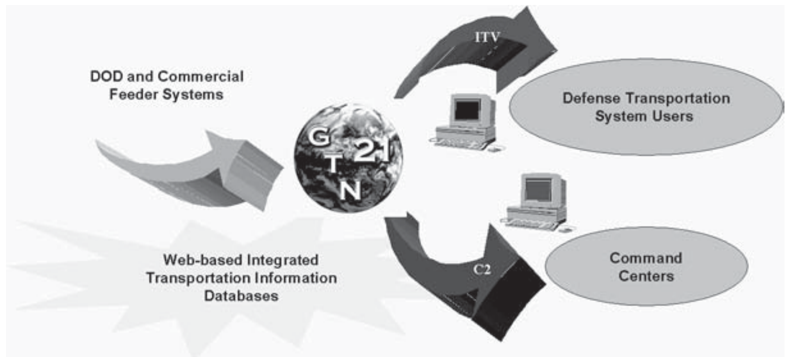
TBMCS 1.1.3 and the other GCCS-AF systems fielded to the Falconers experienced software problems during early government in-plant testing. A June 2004 developmental test resulted in an incomplete test due to configuration and communication issues. A special make-up test occurred a month later, with additional software issues leading to a second developmental test in October 2004. October tests will confirm if the system is ready to proceed to operational testing. Operational testing of TBMCS 1.1.3 and Air Operations Center–Weapon System is February 2005.

DCAPES entered operational testing with GCCS-Joint in January 2004. Both DCAPES and the Joint Operational Planning and Execution System had performance and database synchronization issues. After numerous software changes, database server upgrades, and concept of operations changes for GCCS-Joint, both systems resumed operational testing in June 2004. The two critical issues regarding database synchronization and overall system performance are still unresolved. DCAPES requires additional development and operational testing before full fielding.

Global Transportation Network 21st Century (GTN 21)

SUMMARY

- Global Transportation Network 21st Century (GTN 21) Release 1.1 developmental test/operational assessment identified problem areas in two of five major areas of interest.
- The developmental test/operational assessment of Releases 1.2 and 1.3 will further clarify system performance status and assess system readiness for Increment 1 Initial Operational Test and Evaluation (IOT&E). Increment 1 subsumes Releases 1.1, 1.2, and 1.3.



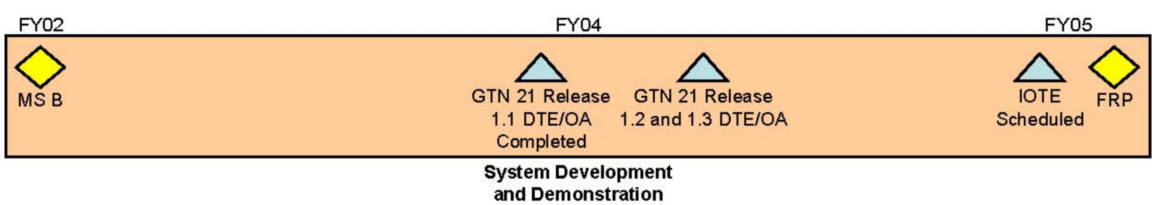
GTN 21 will provide in-transit visibility and Command and Control for the United States Transportation Command to meet operations planning and analysis support requirements.

SYSTEM DESCRIPTION AND MISSION

GTN 21 is an upgrade to GTN, which the United States Transportation Command developed after the 1991 Gulf War to provide an extensive database of transportation information. GTN 21 will provide in-transit visibility and Command and Control for Headquarters United States Transportation Command to meet operations planning and analysis support requirements. GTN 21 extends the basic function of GTN, which provides in-transit visibility of forces, personnel, and materiel for DoD users at all levels. Currently, there are more than 10,000 registered users for GTN. On average, the system performs three million transactions a day. The upgraded system design, GTN 21, accommodates more than six million transactions a day and provides a data warehouse with at least two years of historical data.

GTN 21 is a web-based system that will have more external interfaces than GTN. In addition to in-transit visibility, GTN 21 will provide command and control capability. GTN 21 will have a standard database structure, which is well documented and easily accessible by Defense Transportation System users and systems. GTN 21 supports the information needs of users in planning, directing, and monitoring global transportation activities. With the ability to provide simultaneous support of multiple events with real-time, historical, and/or forecasted transportation data, GTN 21 will be invaluable to the DoD transportation planners. GTN 21 will also provide an archive of historical data to store selected operational contingencies and major exercises to support future analysis and decision-making.

TEST AND EVALUATION ACTIVITY

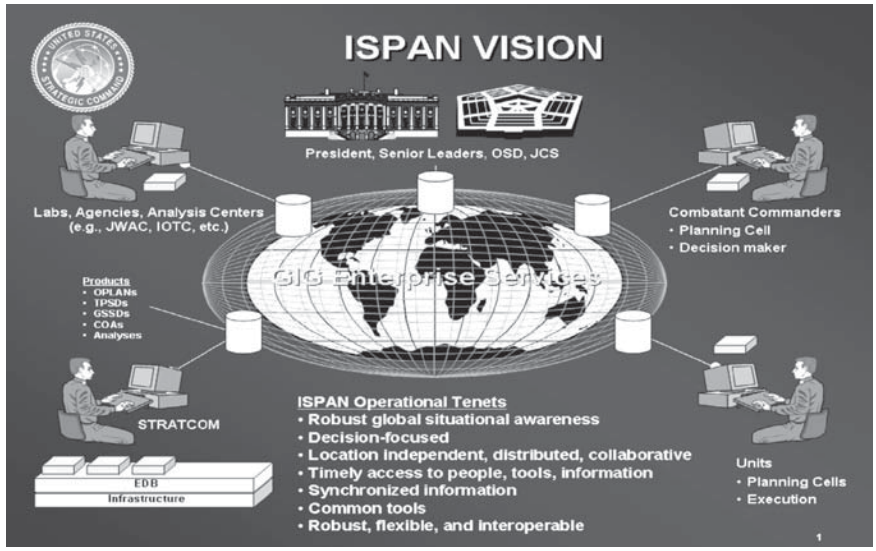


DOT&E approved a Test and Evaluation Master Plan for GTN 21 in January 2003. In FY04, there have been three combined developmental tests/operational assessments for Releases 1.1, 1.2, and 1.3. The developmental test/operational assessment for Releases 1.2 and 1.3 is ongoing. The IOT&E is planned for 2QFY05.

TEST AND EVALUATION ASSESSMENT

The developmental test/operational assessment of Release 1.1 met the objectives of the testing. Of the five major areas of interest, the testers scored three as satisfactory and two as marginal. The Interface Manager was unable to process several of the source system data files, resulting in a marginal rating. The Itineraries and Schedules function, with many outstanding unresolved priority 2 deficiencies, also received a marginal rating. DOT&E will review and assess the reports and data from Release 1.2 and 1.3 developmental test/operational assessment and Increment 1 IOT&E when available.

Integrated Strategic Planning and Analysis Network (ISPAN)



The ISPAN modernization will provide deliberate and adaptive strategic nuclear planning as well as the capability to accommodate non-strategic nuclear forces and new missions.

SUMMARY

- The Integrated Strategic Planning and Analysis Network (ISPAN) Modernization Block 1 Milestone A/B was approved on July 13, 2004.
- The Air Force selected the ISPAN modernization contractor August 26, 2004.
- The ISPAN Test and Evaluation Master Plan, approved in October 2004, identifies a test strategy that ensures appropriate levels of testing for each of five ISPAN software development spirals and supports incremental fielding decisions. A Test and Evaluation Master Plan revision (to update the spiral strategy content based on the approved contract and to add objectives and measures of performance and effectiveness for Block 1) will be complete in January 2005.
- Testing of the first spiral of ISPAN Modernization Block 1 will occur in April 2005.

SYSTEM DESCRIPTION AND MISSION

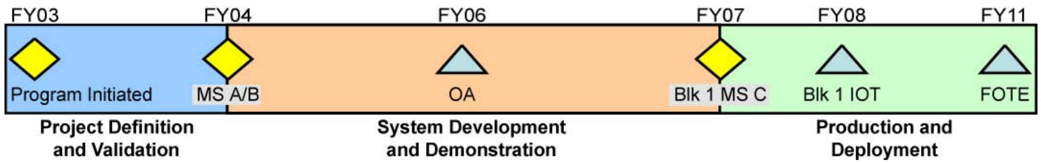
The ISPAN (formerly Strategic War Planning System) is an operational information technology planning system for United States Strategic Command. The ISPAN modernization provides deliberate and adaptive strategic nuclear planning and develops the capability to accommodate non-strategic nuclear forces and new mission planning and analysis.

For over 30 years, the Strategic War Planning System provided dedicated planning and analysis to create, maintain, and modify the Single Integrated Operational Plan for all land, air, and sea-launched nuclear weapons in the U.S. inventory. In 2003, changes in the Unified Command Plan assigned the United States Strategic Command responsibility for Global Strike, Global Missile Defense, and Information Operations. In addition, the United States Strategic Command assumed responsibility for global command, control, communications, computers, intelligence, surveillance, and reconnaissance. To fulfill these new and evolving missions, ISPAN must become capable of both deliberate and adaptive planning, employing the full spectrum of kinetic and non-kinetic weapons. The new planning system must interoperate with other DoD planning systems and facilitate the planning, analysis, and employment of non-strategic nuclear forces.

The ISPAN modernization acquisition strategy calls for an incremental acquisition with three blocks. Each block consists of multiple spiral software modifications with a semi-annual implementation schedule in conjunction with the current ISPAN operations and maintenance software upgrade schedule. The Air Force Operational Test and Evaluation Center is the operational test agency for all phases of operational test and evaluation for ISPAN. The United States Strategic Command is the fielding authority for the ISPAN modernization modifications into the ISPAN operational software baseline.

ISPAN modernization is a mission critical computer resource under the Nunn-Warner Amendment and is an Acquisition Category Level 1AM.

TEST AND EVALUATION ACTIVITY



Approval of the ISPAN Modernization Block 1 Milestone A/B occurred in July 2004 without an approved Test and Evaluation Master Plan. Since contract proposals for development of the ISPAN spirals varied significantly, the details of ISPAN testing had to wait until after the selection of the contractor for the modernization contract. Based on an agreed to test strategy and high-level evaluation Critical Operational Issues, the Acquisition Decision Memorandum agreed to an initial Test and Evaluation Master Plan outlining a test strategy with a detailed update to the Test and Evaluation Master Plan occurring 150 days after the ISPAN modernization contract award. The Air Force awarded contracts for Block 1 Modernization August 26, 2004. The Test and Evaluation Master Plan revision to address the contracted spirals content and add objectives, measures of performances, and measures of effectiveness began in September 2004.

TEST AND EVALUATION ASSESSMENT

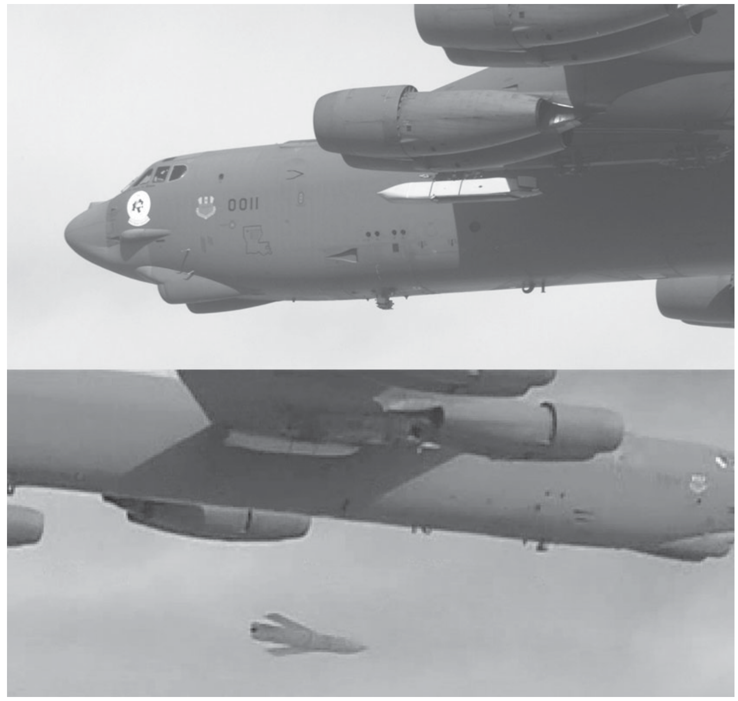
The unique and critical mission of producing the Single Integrated Operational Plan and related plans must continue during ISPAN modernization. New mission capabilities occur through periodic software upgrades. Therefore, it is necessary that the operational test agency evaluate the upgrade's impact on existing functionality while assessing the operational effectiveness and suitability of the new capability software.

The current spiral schedule requires completion of all development, developmental testing, combined developmental testing/operational testing, and dedicated operational test and evaluation in approximately six-month intervals. The program office, operational test agency, and DOT&E assess each spiral to ensure the operational test agency conducts an adequate and appropriate level of testing, evaluation, and reporting. To support this schedule, the operational test agency is integrating testers into the United States Strategic Command ISPAN development and evaluation organization in order to accomplish all testing and reporting in a timely manner to support a spiral fielding decision.

Joint Air-to-Surface Standoff Missile (JASSM)

SUMMARY

- In the DOT&E beyond low-rate initial production report to Congress, we state the Joint Air-to-Surface Standoff Missile (JASSM) demonstrated effectiveness, survivability, and lethality against a representative set of targets and threats during Initial Operational Test and Evaluation (IOT&E).
- JASSM experienced several failures during IOT&E that resulted in mission reliability of approximately 50 percent, which makes JASSM operationally unsuitable.
- The Milestone III Test and Evaluation Master Plan (TEMP), approved in April 2004, directed a Follow-on Operational Test and Evaluation (FOT&E) to conduct additional flight tests and evaluate JASSM mission reliability.
- During FOT&E, JASSM completed only two of five missions – leading to a "stop test." The program office is reviewing options and approaches to improve reliability and resume testing. JASSM remains certified for operational use.



JASSM is a medium range (200 nautical miles) conventional cruise missile capable of striking high value targets with great precision from outside the lethal range of air defense threats.

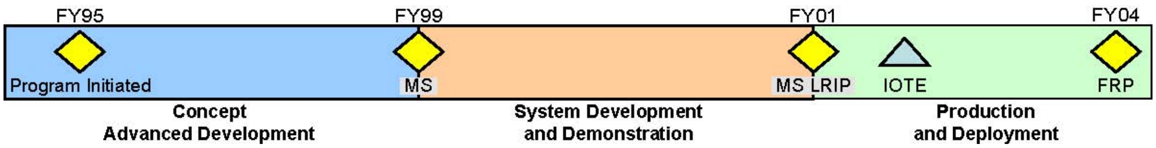
SYSTEM DESCRIPTION AND MISSION

JASSM is a medium range (200 nautical miles) conventional cruise missile capable of striking high value targets with great precision from outside the lethal range of air defense threats. It uses a 1000-pound, hardened, penetrating warhead that can attack hardened and shallow buried targets. JASSM uses Global Positioning System coupled with an inertial navigation system, and can use an imaging infrared seeker for even greater accuracy. B-52H and B-1 aircraft can carry and launch JASSM; ongoing integration will add the F-16, B-2, and eventually the F/A-18 and F-15E.

JASSM is an all-up-round weapon system stored in its own container, and requires minimal maintenance and checkout. The missile weighs 2,250 pounds and is 168 inches long. The missile uses automated mission planning to plan missile routes and combine them with aircraft mission plans. To achieve the highest accuracy and use of the missile seeker, crews electronically transfer a pre-planned seeker "template" (a wire diagram picture of the target area) from a rear planning unit and match it to the missile route. Crews can carry additional missile missions and change them while airborne. Crews can also substitute a simplistic missile route planned on the aircraft.

The Air Force is developing a variant to JASSM, named JASSM-Extended Range. The JASSM-Extended Range missile (AGM-158B) is identical in external shape and dimensions as the baseline JASSM missile (AGM-158A). The new missile includes new engine, engine frame, fuel tanks, fuel distribution system, engine inlet, internal frame, power and engine control unit, and software. These changes lead to an overall weight increases, with a required range more than twice the baseline JASSM. The program is also developing an electronic safe-and-arm fuze to replace the existing fuze. The Air Force and Navy are developing a common architecture weapon datalink for use in all air-to-ground weapons. They intend to incorporate this into JASSM in FY06.

TEST AND EVALUATION ACTIVITY



The Air Force completed operational testing in October 2003. The Air Force conducted additional evaluation of missile performance into February 2004. The Air Force reported JASSM as effective and potentially suitable, with a mission reliability of about 55 percent. The program completed two additional development missions, one a failure (October 2003) and one a success (March 2004). DOT&E completed the beyond low-rate production report in April, rating JASSM as effective but not suitable, with a mission reliability of 53 percent.

DOT&E approved the Milestone III Test and Evaluation Master Plan in February, with the following stipulations:

- Conduct FOT&E to evaluate reliability and address unanswered issues found during IOT&E.
- Return to the Office of the Secretary of Defense (OSD) with detailed test strategies for JASSM-Extended Range, a new electronic fuze, and JASSM datalink.

The program completed five missions in follow-on testing, with only two successes. The first mission was a B-1 operational test mission against a soft target (a success). The second was a B-2 mission planned in the Gulf of Mexico. This mission failed when the crew could not correctly load a re-planned mission into the missile during flight. A mission planning software error caused this failure. The third mission was a success, launching JASSM from a B-1 against a soft ground target. The fourth mission, launched from an F-16, failed to reach engine start due to a generator problem. The fifth mission, also a failure, went out of control in the target area after a B-2 launch. Analysis shows the fuze electronically shorted out the control system on the missile. After this last failure, the Air Force Operational Test and Evaluation Center stopped all operational flight tests.

TEST AND EVALUATION ASSESSMENT

Operational testing showed that JASSM could destroy planned targets with great accuracy and precision, including soft targets, medium hardened bunkers, and earth-mounded very hard bunkers. In many cases, JASSM destroyed the target with a single missile. JASSM performed better than predicted against its hardest target, needing less missiles than predicted to achieve a kill. JASSM exceeded range requirements, and proved sufficiently robust to handle Global Positioning System jamming, target camouflage, and a range of environmental conditions without degrading capability. Three fuze failures occurred during operational testing. Failure analysis determined that fuze production quality problems caused two failures. It could not positively identify the cause of the third failure.

Mission planning is a concern. The user requirement is to complete a JASSM mission in 10 minutes (average). Operational testing (B-52) completed 144 missile missions for eleven aircraft sorties in 16 minutes (average). B-1 JASSM integration testing completed 48 missile missions for two aircraft sorties, with times ranging from 15 to 25 minutes (average). B-1 testing could complete only 24 missions at a time.

FOT&E began in April 2004, but stopped in August after consecutive failures. Mission reliability, expected to progress as improvements were implemented into production missiles, has instead declined to 50 percent. Follow-on testing included the evaluation of F-16 integration and development, B-1 integration and operational testing, and B-2 development missions.

The program is designing a new strategy to improve reliability, including additional developmental testing, correction of deficiencies in missiles delivered to the field, and additional operational testing to demonstrate improving reliability. At OSD direction, the program is undergoing a reliability enhancement review, with results expected in November. The program is considering options to address mission reliability and provide a path that can verify system capability before we will approve resumption of FOT&E.

The program will return to OSD with a TEMP and test plan for JASSM-Extended Range, the new fuze, and the datalink. We expect this test planning effort to follow the re-design of FOT&E.

Joint Direct Attack Munition (JDAM)

SUMMARY

- Operational testing confirmed that Joint Direct Attack Munition (JDAM) reliability and mission planning now meet requirements.
- The 1,000-pound JDAM variant is effective and suitable when delivered by the F/A-18.
- Delivery of the 1,000-pound variant from the F/A-22 is still necessary to complete multi-Service operational test and evaluation (MOT&E) of the 1,000-pound JDAM.
- Initial operational testing of the 500-pound JDAM variant will include the evaluation of a redesigned JDAM container.
- Operational testing through FY04 of the 500-pound JDAM indicates performance meets requirements.
- Operational testing through FY04 of the JDAM with the FMU-152 fuze also indicates performance meets requirements.
- DOT&E approved the Test and Evaluation Master Plan, covering testing of the 500-pound JDAM variant, in March 2004.

Operational testing of the 500-pound JDAM variant through FY04 on both the F/A-18 and B-2 indicates performance meets requirements.

SYSTEM DESCRIPTION AND MISSION

The JDAM, produced by The Boeing Company, is a low cost, autonomously controlled, adverse weather, accurate guidance kit for the Air Force/Navy 2,000-pound Mk-84 and BLU-109 general-purpose bomb, the 1,000-pound Mk-83 and BLU-110 general-purpose bomb, and the Mk-82 500-pound bomb. There are no planned design changes to the bombs. However, the existing inventory of weapons will be configured with JDAM guidance kits and wind strake assemblies. An inertial navigation system provides primary guidance of the JDAM. Enhanced accuracy of the JDAM is provided by augmentation of the inertial navigation system by signals received from the Global Positioning System (GPS).

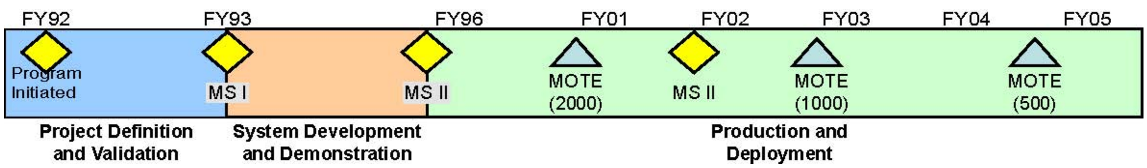
The JDAM kit is required to yield a delivery accuracy of less than 13 meters when GPS is available and less than 30 meters when GPS is absent or jammed after release. A variety of fighter/attack and bomber aircraft employ JDAM, allowing precision engagement from all altitudes under adverse environmental conditions. The primary aircraft for integration and operational testing of the 2,000-pound JDAM were the B-52H and the F/A-18C/D. The F-16, F-14B/D, F-15E, F/A-18E/F, B-1, and B-2 are also operational users of the 2,000-pound JDAM. The 1,000-pound JDAM is integrated on the F/A-18C/D and the AV-8B. Integration of the 1,000-pound JDAM variant will also occur in the F/A-22. The 500-pound JDAM will be tested and integrated initially on the F/A-18C/D and B-2.

JDAM completed operational test of the 2,000-pound variant in August 2000. Operational tests were adequate to evaluate the operational effectiveness and suitability of the 2,000-pound variant. Test results demonstrated the 2,000-pound variant is operationally effective, but not operationally suitable. However, the high degree of effectiveness and substantial increase in targeting and weapon delivery flexibility were sufficient to justify fielding the 2,000-pound variant. The “not suitable” assessment resulted from shortfalls in container durability, system reliability, and a failure to

meet mission-planning timelines. While operational testing of the 1,000-pound variant in FY03 confirmed system reliability and mission planning met requirements, container reliability will be re-evaluated during operational testing of the 500-pound variant beginning in FY04.

Testing determined JDAM is operationally effective only in combination with existing fuzes, specifically the FMU-139 and FMU-143. Testing is required with the FMU-152 Joint Programmable Fuze. Operational testing of JDAM with the FMU-152 is planned during initial operational test of the 500-pound JDAM variant beginning in FY04. DOT&E approved the Test and Evaluation Master Plan in March 2004, which covers testing of the 500-pound JDAM variant.

TEST AND EVALUATION ACTIVITY



Operational testing of the 500-pound JDAM variant began in March 2004 on the B-2. Air Force operational testing with the B-2 included both simulated and actual weapon release events. During operational test, the B-2 released a total of 182 weapons, with a ripple-release of 80 weapons on a single attack. Air Force operational testing with the 500-pound variant also included weapon releases from the F-16.

Delivery from the Navy threshold aircraft, the F/A-18C/D, began in July 2004. Plans call for a total of 29 weapons from the F-18, to include a ripple-release of eight weapons on a single attack. However, a ripple of eight weapons requires use of the BRU-55 weapons rack, which remains in development. DOT&E approved a Navy request to defer operational testing of the 500-pound JDAM variant from the BRU-55 until FY05.

Operational testing of the 500-pound JDAM variant should conclude in FY05.

TEST AND EVALUATION ASSESSMENT

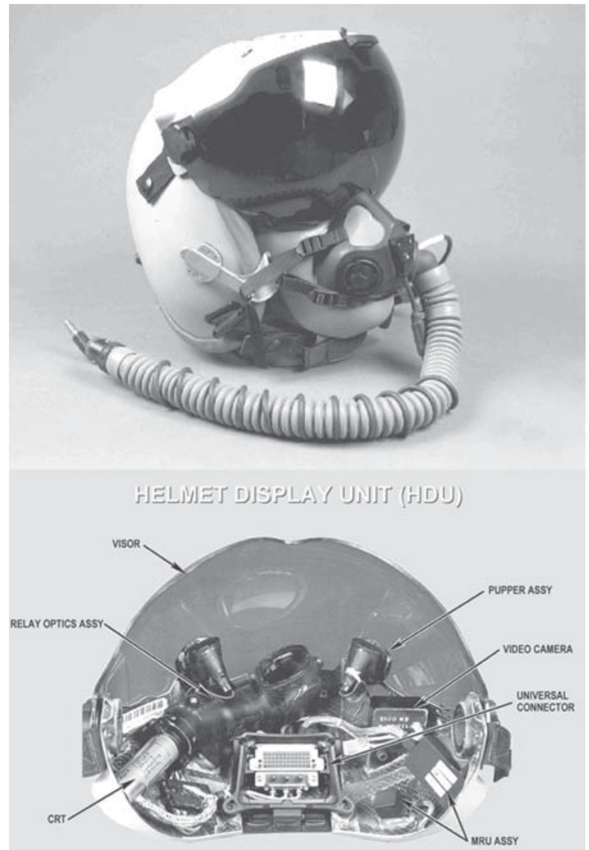
MOT&E of the 1,000-pound JDAM variant delivered during the F/A-18 phase of operational testing confirmed operational effectiveness and suitability of the 1,000-pound JDAM when delivered from this aircraft. Operational testing confirmed that JDAM reliability and mission planning now meet requirements. However, a redesigned JDAM container was not ready for evaluation during FY03 operational testing. Initial operational testing of the 500-pound JDAM variant will include the evaluation of a redesigned JDAM container. Delivery of the 1,000-pound variant from the F/A-22 is still necessary to complete MOT&E of the 1,000-pound JDAM.

Operational testing through FY04 of the 500-pound JDAM indicates performance meets requirements. Operational testing through FY04 of the JDAM with the FMU-152 also indicates performance meets requirements.

Joint Helmet Mounted Cueing System (JHMCS)

SUMMARY

- In January 2004, DOT&E published the beyond low-rate initial production report and evaluated the Joint Helmet Mounted Cueing System (JHMCS) as effective for daylight operations and not suitable for reliability reasons.
- The Services are exploring options to provide JHMCS compatibility with night vision goggles.



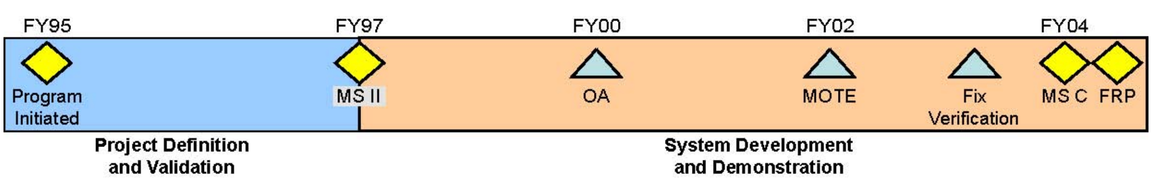
JHMCS allows the pilot to simply look at a target in order to designate it to one of the aircraft's weapons systems.

SYSTEM DESCRIPTION AND MISSION

The JHMCS is a modified HGU-55/P helmet that incorporates a visor-projected heads-up display to cue weapons and sensors to the target. It improves effectiveness in both air-to-air and air-to-ground missions. In close combat, a pilot must currently align the aircraft to shoot at a target. JHMCS allows the pilot to simply look at a target in order to designate it to one of the aircraft's weapons systems. This system projects visual targeting and aircraft performance information on the back of the helmet visor, enabling the pilot to see this information while looking outside the cockpit.

The Services will employ the JHMCS in the FA-18C/D/E/F/G, F-15C/D, and F-16 Block 40/50 aircraft with a design that is 95 percent common to all three platforms. The Air Force eliminated funding for JHMCS in the F/A-22. When used in conjunction with an AIM-9X missile, JHMCS allows a pilot to effectively designate and kill targets in a cone more than 80 degrees to either side of the nose of the aircraft, or high-off-boresight.

TEST AND EVALUATION ACTIVITY



In January 2004 DOT&E published the beyond low-rate initial production report and evaluated the JHMCS as effective for daylight operations and not suitable for reliability reasons. Multi-Service operational test and evaluation (MOT&E) of JHMCS began in June 2001 for the Air Force and October 2001 for the Navy, and ended in June 2002. The final MOT&E report recommended fix-and-verification of eight deficient areas prior to a full-rate production decision. From January through March 2003, the Air Force Operational Test and Evaluation Center and the Navy's Operational Test and Evaluation Force performed fix verification testing on the eight deficient areas. The Navy equipped two squadrons with the JHMCS as an early operational capability and they used it for approximately ten months, flying over 4,700 JHMCS hours, including combat in Iraq. After completing the correction of the eight deficient areas, the Services began full-rate production and fleet introduction of the JHMCS in January 2004.

TEST AND EVALUATION ASSESSMENT

Based on MOT&E data and test observations, DOT&E determined that JHMCS was operationally effective, but not operationally suitable due to significant deficiencies in reliability and maintainability. Since fleet introduction, the services have solved the reliability problems and achieved an acceptable system reliability rate.

JHMCS brings a significant increase in combat capability by allowing aviators to look and designate air and ground targets in a matter of seconds and without maneuvering their aircraft. This capability, however, has one significant limitation: limited night capability. The Services are exploring options to provide JHMCS compatibility with night vision goggles.

Joint Primary Aircraft Training System (JPATS)

Follow-on operational test and evaluation began in October 2003, and will continue into 2005.

SUMMARY

- The DOT&E beyond low-rate initial production report determined the system, as tested and currently configured, was operationally effective with numerous limitations, deficiencies, and workarounds and not operationally suitable.
- Results of the recent reliability, maintainability, and availability demonstration are still under evaluation.
- Results of the system-level Training Information Management System test are still under evaluation.

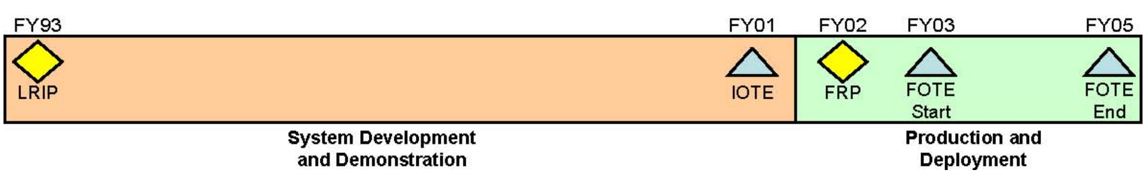
SYSTEM DESCRIPTION AND MISSION

The Joint Primary Aircraft Training System (JPATS) is a system of primary flight training devices tailored to meet Air Force and Navy aircrew requirements. The principal JPATS mission is to train entry-level Air Force, Navy, and Marine Corps student pilots in primary flying skills to a level of proficiency at which they can transition into advanced training. Such training leads to qualification as military pilots, navigators, and naval flight officers. The JPATS replaces the Air Force T-37B and Navy T-34C aircraft and their associated ground-based training systems.

The JPATS consists of the T-6A Texan II air vehicles, simulators, and associated ground-based training devices, a training integration management system (TIMS), instructional courseware, and contractor logistics support. The Services will acquire common aircraft and the remaining components will be as common as possible. Logistics support is tailored to each Service's maintenance concept.

Initial student training began in October 2001 at Moody Air Force Base, Georgia. Currently, aircraft are being delivered to Laughlin Air Force Base in Del Rio, Texas, the second entry-level student training base, and to the Naval Air Station in Pensacola, Florida, where naval flight officers training began September 2003.

TEST AND EVALUATION ACTIVITY



A multi-Service system-level, end-to-end test with a class of entry-level students began in June 2002 at Moody Air Force Base, Georgia, and concluded in January 2003. The composition of the class was twelve Air Force and five Navy students who were observed throughout the entire course. This was the first time the aircraft and the ground-based components were evaluated as a complete system.

Follow-on operational test and evaluation began in October 2003, and will continue for approximately two years. DOT&E approved the test plan for follow-on operational test and evaluation in September 2003. Four major areas that will be assessed during this testing are a Navy specific T-6A evaluation at Naval Air Station Pensacola, Florida; an Air Force TIMS evaluation at Laughlin Air Force Base, Texas; a T-6A suitability evaluation at Laughlin Air Force Base, Texas; and a Navy TIMS evaluation at Naval Air Station Corpus Christi, Texas.

The suitability evaluation at Laughlin Air Force Base included a reliability and maintainability demonstration involving 40 aircraft flying roughly 4,000 flight hours. The assessment will determine the operational suitability whether the aircraft is meeting contractual requirements.

TEST AND EVALUATION ASSESSMENT

DOT&E's beyond low-rate initial production report to Congress, dated November 2001, concluded that the T-6A aircraft was operationally effective (with numerous limitations, deficiencies, and workarounds) and not operationally suitable. Deficiency and safety-related areas included the engine, environmental control system, ultra-high frequency and very high frequency radio performance, flight manuals and checklists, the emergency oxygen system, ground egress, the trim systems, power control lever, wheel brakes, cockpit storage, and rear view mirrors. Improvements have been noted in the past year. Still unresolved are the inter-cockpit communications system, the emergency oxygen system, the slow rate of pitch trim (the trim system is currently in re-design), and braking performance. Suitability results are under evaluation.

The T-6A ground-based training system consists of three major components: simulators and other aircrew training devices, the computer-based courseware, and the TIMS. The aircrew training devices and the computer-based courseware are working well with minor deficiencies. However, TIMS was not operationally effective or suitable during the end-to-end evaluation. Numerous workarounds and real-time changes were required to keep the system running. Functions that worked include academics, student status, schedule viewer, and the gradebook. Functions that required workarounds include the schedule build (flight-level only), training forecast schedule, maintenance, and the flight surgeon inputs. Many deficiency corrections have been incorporated. We are evaluating the results of the TIMS test.

KC-135 Global Air Traffic Management Upgrade

By incorporating digital technology, the airline industry and civil aviation authorities expect to increase the capacity, safety, and efficiency of airspace use.

SUMMARY

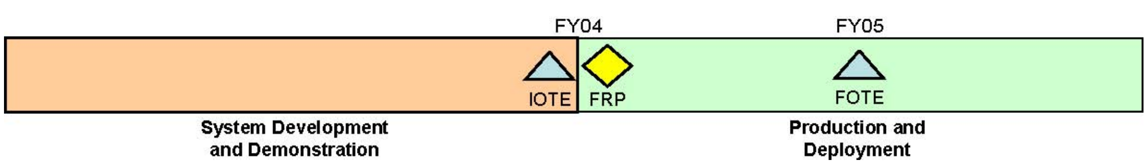
- The KC-135 is the lead DoD platform for Communications, Navigation and Surveillance for Air Traffic Management (CNS/ATM) modifications, formerly called Global Air Traffic Management (GATM).
- The test team conducted two distinct Integrated Systems Evaluations in operationally realistic civil-controlled, oceanic, and reduced separation airspace to demonstrate readiness for Initial Operational Test and Evaluation (IOT&E).
- DOT&E approved the Test and Evaluation Master Plan (TEMP) and Operational Test Plan in September 2003.
- DOT&E evaluated the KC-135 GATM as not operationally effective for its global mobility mission because of information assurance limitations (detailed in the beyond low-rate initial production report).
- The KC-135 GATM aircraft is operationally suitable.

SYSTEM DESCRIPTION AND MISSION

The purpose of the Air Traffic Management upgrade program is to preserve DoD access to efficient global air traffic routes and airfields into the 21st century. CNS/ATM modifications will equip DoD aircraft to meet the requirements of worldwide civil aviation authorities' air traffic management systems. The KC-135R is the lead DoD upgrade platform.

In the new CNS/ATM environment, aircraft must maintain highly accurate position, and transmit aircraft position and intent to ground Air Traffic Control facilities and other aircraft via a data link. The Federal Aviation Administration and other civil air traffic control entities, encouraged by the commercial airline industry, have a strategy to equip international air carriers with state of the art CNS/ATM technology. By incorporating digital technology, the airline industry and civil aviation authorities expect to increase the capacity, safety, and efficiency of airspace use, particularly in trans-oceanic and other areas lacking ground radar surveillance. These technologies and capabilities allow reduced aircraft separations and new procedures to be introduced maximizing the use of desirable airspace while maintaining safety standards.

TEST AND EVALUATION ACTIVITY



The KC-135 GATM test and evaluation program occurred in three phases during the initial fielding of key elements: Phase I and Phase II/IIA were Qualification Tests and Evaluations (QT&Es), while Phase III was a dedicated IOT&E. Phase I (October 2001 to January 2002) involved laboratory testing of the prototype configuration. Phase II (January 2002 to November 2002) involved ground and flight test of the installed communications, navigation, and surveillance

equipment on prototype aircraft. Phase IIA (October 2002 to August 2003) involved the installation of the production representative changes on prototype aircraft, as well as ground and flight testing.

The Air Force Flight Test Center conducted developmental test and evaluation; laboratory, ground, and flight tests included the prime contractor. During Phase II/IIA, the Air Force Operational Test and Evaluation Center (AFOTEC) participated in order to determine system readiness for IOT&E. Two distinct Integrated Systems Evaluations in operationally realistic civil-controlled, oceanic, and reduced separation airspace finally confirmed readiness for IOT&E. DOT&E approved the TEMP and Operational Test Plan in September 2003. The AFOTEC conducted the IOT&E in September and October 2003, using aircraft from the initial operational unit located at Fairchild Air Force Base, Washington. The modified tankers participated in global, as well as local, air refueling sorties, maintenance demos, and information assurance testing. Operational pilots flew one aircraft around the world to demonstrate capability across a typical range of air traffic control centers, including operation in 10 of the 17 worldwide Flight Information Regions.

TEST AND EVALUATION ASSESSMENT

A detailed evaluation of the IOT&E results can be found in the beyond low-rate initial production report published by DOT&E in 2004. IOT&E was an adequate and comprehensive evaluation of the KC-135 modifications. The operational testing included ground tests on three aircraft.

DOT&E evaluated the KC-135 as not operationally effective for its global mobility mission because of information assurance limitations, which are detailed in the beyond low-rate initial production report. Throughout testing, the navigation database produced by the National Geospatial-Intelligence Agency was not certified by civil aviation authorities. Hence, some of the expected KC-135 procedures and capabilities could not be authorized for testing or operational use. The navigation database is now certified and will be re-evaluated during follow-on operational test and evaluation (FOT&E), planned to begin in February 2005.

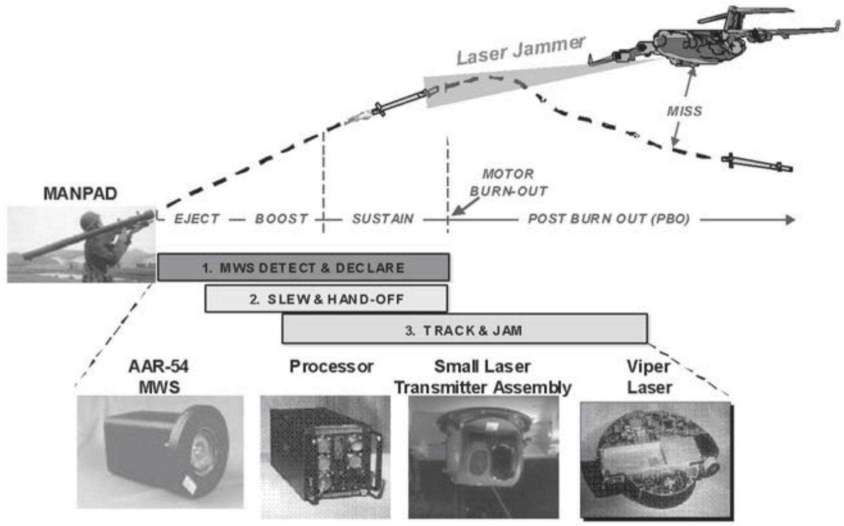
The KC-135 GATM aircraft is operationally suitable; however, some training is in need of improvement. The instructors were not familiar with civil procedures and equipment, but implementing recommendations from AFOTEC should improve future training. In general, the installed communications, navigation, and surveillance equipment is reliable and maintainable.

Formation flying with both modified and unmodified KC-135 aircraft is planned for evaluation during FOT&E. Additionally, flight and ground crew training, the navigation database, and information assurance testing should be repeated during FOT&E to ensure that documented deficiencies are adequately corrected.

Large Aircraft Infrared Countermeasures (LAIRCM)

SUMMARY

- The Large Aircraft Infrared Countermeasures (LAIRCM) conducted numerous successful tests in 2004, including Initial Operational Test and Evaluation (IOT&E) on the C-17 and C-130.
- Operational test results are being evaluated for a full-rate production decision in 2QFY05.



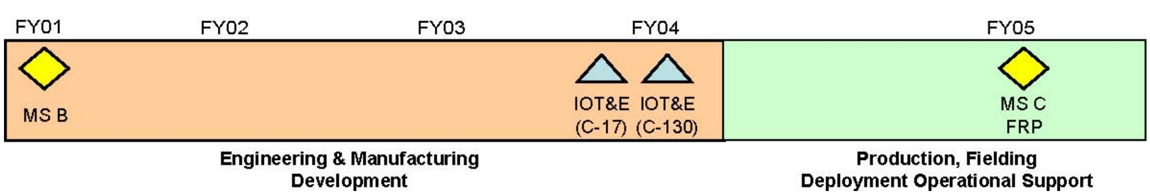
The fundamental requirement for the LAIRCM system is to provide automatic protection against man-portable, shoulder-fired, and vehicle-launched infrared guided missiles.

SYSTEM DESCRIPTION AND MISSION

The Air Force intends for the LAIRCM system to enhance individual aircraft survival on large transport aircraft. The fundamental requirement for the LAIRCM system is to provide automatic protection against man-portable, shoulder-fired, and vehicle-launched infrared guided missiles. The system will be installed on the C-17, C-130, C-5, and the MH-53 aircraft. Quick Reaction Capability units are deployed in Iraq on the C-17 and MH-53. The system currently consists of five basic elements: a Control Indicator Unit, an ultraviolet Missile Warning System (MWS), a Fine Track Sensor subsystem, a Countermeasures Processor, and a laser jam source subsystem. The Air Force will install from one to three laser jammers per aircraft, depending on aircraft type and configuration.

In response to the urgent requirement in the LAIRCM Operational Requirements Document, the Aeronautical Systems Center developed an evolutionary acquisition strategy to equip aircraft with IRCM protection split into two phases. Phase 1 is the near-term solution using four integrated subsystems currently in production (Control Indicator Unit, ultraviolet MWS, Fine Track Sensor, and Countermeasures Processor) and the newly developed multi-band small laser transmitter assembly (SLTA). The Phase 1 system is currently under development and is designed to meet the objective performance requirements of the LAIRCM Operational Requirements Document. The Phase II system replaces the UV missile warning with a higher performance IR missile warning and replaces the current SLTA with a miniaturized laser turret assembly. There is an unfunded spiral development effort to incorporate closed loop jamming technology into the system. Phase 1 developmental test/operational test and IOT&E are complete, and Phase 2 developmental testing began in August 2004 with the enhanced Laser Infrared Flyout Experiment live fire test at Nevada Test and Training Ranges.

TEST AND EVALUATION ACTIVITY



In FY04, the primary test and evaluation activities consisted of completing:

- The C-17 test efforts including: the C-17 baseline test (October 2003 at Edwards Air Force Base), the C-17 regression test (December 2003 at Holloman Air Force Base), C-17 sled test (December 2003 at Holloman Air Force Base), and the C-17 IOT&E (February 2004 at Eglin Air Force Base).
- The Super Multi-Role Electro-optical Simulation demonstration (December 2003 at Holloman Air Force Base).
- The C-130 developmental test/operational test (February 2004 at Eglin Air Force Base).
- The C-130 IOT&E (June 2004 at Eglin Air Force Base) to support a full-rate production decision in 2QFY05.

All of the test and evaluation activities above, except the sled test, consisted of illuminating the C-17 or C-130 with a ground-based threat missile plume stimulator or simulator in order to produce a jamming response from the LAIRCM system. In most cases, infrared radiometers were collocated on the stimulator/simulator to record the jamming laser signal and to assess the power level and jamming technique fidelity. During three tests, the Air Force evaluated false alarm susceptibility and the robustness of the LAIRCM system on the C-17 and C-130 airframes. The sled test consisted of firing a missile down the high-speed test track at Holloman Air Force Base to test whether or not the LAIRCM system could detect, hand off, track, and jam a moving missile. A radiometer was mounted in the nose cone of the sled missile to record the jamming energy. In addition, false alarm sources were also present on the range to stress the MWS system and processor. The purpose of the Super Multi-Role Electro-optical Simulation demonstration was to demonstrate the validity that a missile simulator is the preferred method of testing over a missile stimulator.

In September 2004, Phase 2 developmental testing of the Next Generation MWS and closed-loop laser system was conducted during the enhanced Laser Infrared Flyout Experiment test. In addition, other MWS systems were invited to gather MWS performance data - on their own system - at this same test in order to have a side-by-side comparison of MWS systems' performance.

TEST AND EVALUATION ASSESSMENT

LAIRCM, using the majority of the components of the already fielded Directional Infrared Countermeasures (DIRCM) system, has been successful in testing to date. The previously accomplished DIRCM C-130 tests, the several successful live fire tests against the DIRCM system, and the extensive qualification and environmental tests that were performed on the DIRCM system, all substantially mitigated the usual risks associated with complex systems in development. However, these tests revealed several problems and the program office is working with the contractor to resolve them.

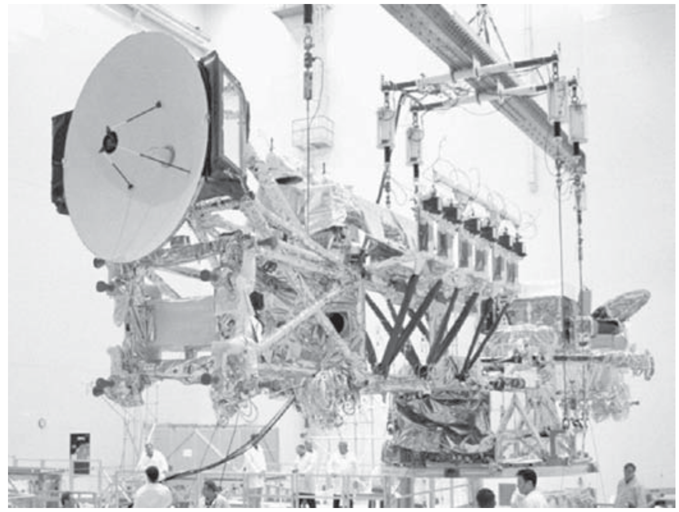
The C-17 baseline test revealed flaws in the jamming sequence logic and in the flare-interaction logic of the system. The program office and the contractor developed new jamming sequence and flare logic to correct the problems. This new software was successfully tested and demonstrated at the C-17 regression test prior to the sled test. The sled test was only partially successful. The complex clutter environment severely stressed the system processor resulting in less than optimum performance. To address these problems, the contractor has undertaken a major effort to develop an upgraded system processor and new or better MWS algorithms to work efficiently in complex clutter environments. These upgrades will be available for testing in January 2005. The C-17 IOT&E, C-130 developmental test/operational test, and C-130 IOT&E have completed and the data are currently being reviewed and processed. Other than the issue with the operation of the system in a complex clutter environment, the only other major issue is the robustness of the automatic bore-sighting of the SLTA. The program office is pursuing a hardware upgrade to the SLTA. The LAIRCM program will seek a full-rate production decision in 2QFY05. Follow-on flight and/or regression testing will be needed to assess the performance of the hardware and software upgrades for the processor and the hardware upgrade for the SLTA.

LAIRCM conducted an aggressive test program in FY04. DOT&E commends the program for recognizing performance problems early and taking immediate corrective action, including regression flight tests, to ensure that that the problems have been rectified. In addition to the performance problems, a number of suitability issues arose during the testing, which are being addressed. In particular, the reliability of the SLTAs needs to be improved to ensure adequate mission readiness when deployed.

Milstar Satellite System

SUMMARY

- The Air Force Operational Test and Evaluation Center (AFOTEC) adjusted its test strategy in response to an Air Force Space Command (AFSPC) decision to use Milstar Communications Planning Tool-Integrated as the primary Milstar communications resource and management tool.
- The Milstar Ground Mobile van retest by AFOTEC demonstrated that the system can provide reliable, sustainable control for the required endurance period.
- Evaluation of three critical measures of effectiveness – Survivable Monitoring and Planning, Communication Area Denied, and Nuller Antenna Effects – has been rescheduled until a fully fielded capability is achieved and tested as a Force Development Evaluation.
- Testing on the nulling antenna has been insufficient for a realistic operational evaluation.



The Milstar Space Segment, as currently fielded with low-data rate/medium-data rate capability, continues to perform well.

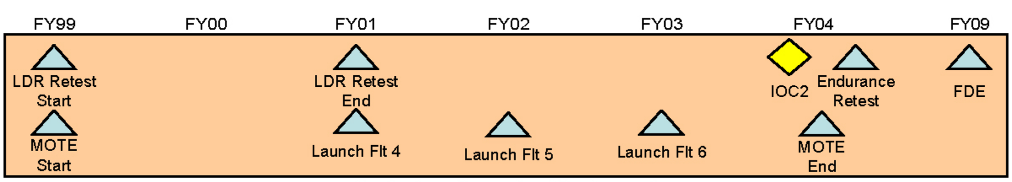
SYSTEM DESCRIPTION AND MISSION

The Milstar Satellite system accomplishes strategic and tactical missions through global communications that are secure, jam-resistant, survivable, and have a low probability of intercept. Milstar provides worldwide coverage for ground, airborne, submarine, and ship terminal communications connectivity. There are three Milstar segments: space, terminal, and mission control.

The Air Force launched six Milstar satellites between 1994 and 2003. The third Milstar launch placed the first low-data rate/medium-data rate satellite (Flight 3) in a non-operational orbit. In lieu of an additional Milstar satellite to replace Flight 3, AFSPC and the United States Strategic Command elected to wait for the first flight of the Advanced Extremely High Frequency satellite program currently scheduled for launch in 2007.

AFSPC declared Initial Operational Capability 1 for the low-data rate Milstar system in July 1997 and declared Initial Operational Capability 2 for the medium-data rate system in December 2003.

TEST AND EVALUATION ACTIVITY



System Development and Deployment

During FY04, AFOTEC completed some open test activity and integrated all its test results in preparation of the final multi-Service operational test and evaluation (MOT&E) report. DOT&E has not yet received the final report.

MOT&E of the low-data rate/medium-data rate satellites began in late FY01. AFOTEC completed low-data rate initial operational test and evaluation (IOT&E) in March 1997. DOT&E and AFSPC recommended that AFOTEC retest six measures of performance. Of these, AFOTEC retested three connectivity measures of performance during 1QFY00 and two suitability measures of performance between June 2000 and May 2001. AFOTEC completed the last of the six retests - Milstar System Endurance - during 2QFY04. DOT&E requested that AFOTEC retest System Endurance because the endurance capability test duration was insufficient. In response, AFOTEC conducted a full endurance test in FY04 using two Ground Mobile vans to control portions of the Milstar satellite constellation.

During FY04, AFSPC decided to use Milstar Communications Planning Tool-Integrated as the primary Milstar communications resource planning and management tool and Automated Communications Management System for specific functions to meet United States Strategic Command requirements. This decision, along with the launch failure of the third Milstar satellite, contributed to delays in completing critical operational evaluations required before Initial Operational Capability 2 declaration. Consequently, AFSPC redefined Initial Operational Capability 2 and postponed operational evaluation of three critical Milstar II requirements until 2005 when Milstar achieves a fully fielded capability. With AFOTEC's Milstar testing participation complete, responsibility shifts to AFSPC for this final phase of operational testing as a Force Development Evaluation. In addition, AFOTEC will test a hybrid version of the Mission Planning Element composed of a combination of both Milstar Communications Planning Tool-Integrated and Automated Communications Management System capabilities as indicated above.

The following measures of effectiveness remain under evaluation for Milstar II:

- Medium-data rate downlink antijam.
- Medium-data rate LPI/LPD.
- Medium-data rate uplink antijam.
- Medium-data rate uplink antijam.
- Information assurance.
- Survivable planning.
- Survivable monitoring and planning.
- Terminal data flow.
- Payload table generation.
- Problem resolution.
- Communication denied area.
- Nuller antenna effects.
- Resource utilization and requirements analysis.

TEST AND EVALUATION ASSESSMENT

The Milstar Space Segment, as currently fielded with low-data rate/medium-data rate capability, continues to perform well. Full assessment by DOT&E of medium-data rate operational effectiveness and suitability will follow after AFOTEC releases its MOT&E report.

The non-availability of Flight 3 capability reduces operational utility. Worldwide coverage from 65 degrees South to 65 degrees North latitude will not be available for the Milstar medium-data rate terminals until the launch of the Advanced Extremely High Frequency satellite in FY07. The lack of a fourth medium-data rate satellite limits the ability to provide two-satellite coverage to some contingency operations and, therefore, limits the throughput of protected communications. In addition, there is no medium-data rate coverage for approximately 25 degrees of longitude.

Proper interoperability evaluation of the Milstar system and terminals in an operational context requires testing of the Joint Task Force mission. Interoperability demonstrations conducted during developmental testing include the Joint Interoperability Test Command medium-data rate interoperability test. Initial results from these tests show coding, encryption, and modulation equipment incompatibility issues between Army and Navy terminals. Until the Joint Task Force concept of operations is better defined, it will be difficult to determine if the limited equipment used in these tests is operationally representative.

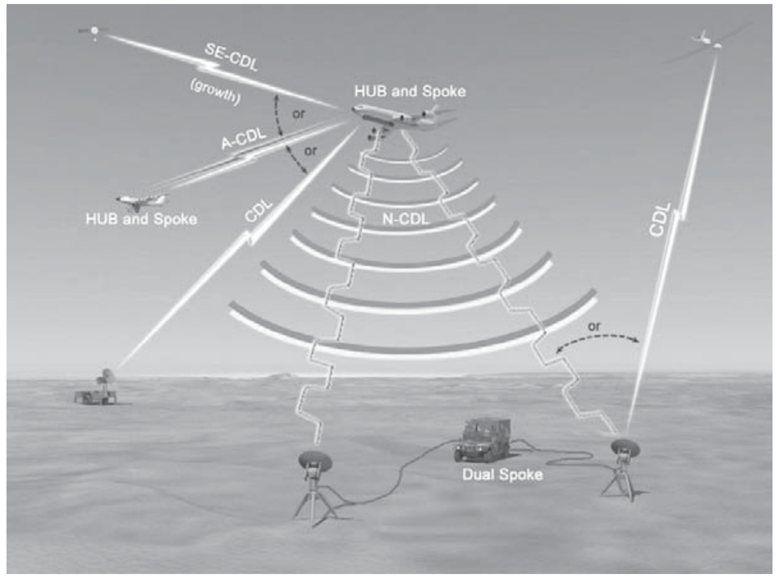
The system endurance retest demonstrated that the Ground Mobile vans could provide reliable, sustainable control of the Milstar constellation for the required endurance period. In this retest, AFOTEC evaluated system endurance, mission effectiveness, human factors, and the ability to rekey distant terminal crypto systems over-the-air.

The nulling antenna testing to date has been insufficient because it was not conducted in an operationally realistic scenario. The direct testing demonstration of communication during jamming has provided limited data collection to characterize the predicted and actual location of the antenna null in any particular event. In addition, no nuller models have been accredited for use in the evaluations of nuller performance during operationally realistic events.

Multi-Platform - Common Data Link (MP-CDL)

SUMMARY

- The Multi-Platform-Common Data Link (MP-CDL) program has not passed any formal acquisition milestones. There is no definitive acquisition program and strategy; however, the program has a Service-approved strategy to get through a 2005 flight demonstration.
- The MP-CDL can provide the data link for the Multi-platform Radar Technology Insertion Program (MP-RTIP) and the Network Centric Collaborative Targeting (NCCT) programs. However, the NCCT program recently decided not to use MP-CDL as its data link.
- Testing has been limited to laboratory testing of developmental hardware.
- There is no approved Test and Evaluation Master Plan for the MP-CDL program. The test program is in flux with the cancellation of planned testing at the Roving Sands 2005 exercise.



MP-CDL will provide the means to exchange data between the JSTARS E-8C and Common Ground Station, Global Hawk, E-10A aircraft, and the Army and Air Force Distributed Common Ground Systems.

SYSTEM DESCRIPTION AND MISSION

The Air Force planned the initial installation of the MP-CDL for the E-8C Joint Surveillance Target Attack Radar System (JSTARS) as a replacement for the E-8C's Surveillance and Control Data Link. The E-8C Surveillance and Control Data Link transmits data to and from the E-8C aircraft and its ground station, and the Common Ground Station. The Multi-Platform Radar Technology Insertion Program (MP-RTIP), which originated as a radar upgrade to JSTARS, requires a more capable data link to transmit radar data. The Air Force restructured the MP-CDL program to be the data link for a Network Centric Warfare capability. The NCCT no longer plans to use the MP-CDL. However, the MP-CDL Capability Development Document includes requirements to support both the MP-RTIP and NCCT programs.

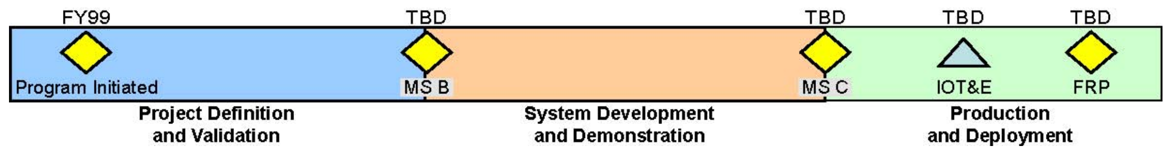
The MP-CDL was originally to replace the JSTARS data link, as the higher quantities of data generated by the MP-RTIP radar required a more robust data link than the JSTARS could provide. MP-CDL provides several orders of magnitude greater data throughput, and will provide the means to exchange data between the JSTARS E-8C and Common Ground Station, Global Hawk, E-10A aircraft, and the Army and Air Force Distributed Common Ground Systems.

The Air Force restructured the MP-CDL program to support the NCCT Advanced Concept Technology Demonstration. The NCCT Advanced Concept Technology Demonstration requires the low data latencies provided by MP-CDL rather than its high throughput. The NCCT Advanced Concept Technology Demonstration provides a combat capability by networking command, control, and intelligence, surveillance, and reconnaissance assets into a collaborative entity. NCCT should dramatically improve target location accuracy, timeliness, and combat identification certainty for the warfighter. Networking optimizes high-speed machine-to-machine interaction between sensors for detection, association,

and correlation of high-interest and time-sensitive targets. NCCT is focused on the find, fix, track, and assess elements of the kill chain.

Most recently, the NCCT program has backed out of its previous intention of using the MP-CDL as its data link for networking intelligence, surveillance, and reconnaissance assets. This will not allow the MP-CDL the opportunity to test low data latency requirements.

TEST AND EVALUATION ACTIVITY



Test and evaluation activity has been limited to laboratory testing at the contractor's facility of MP-CDL hardware, which is still in development.

The Air Force Operational Test and Evaluation Center has begun development of an operational test concept for MP-CDL.

There is no completed MP-CDL program Test and Evaluation Master Plan.

TEST AND EVALUATION ASSESSMENT

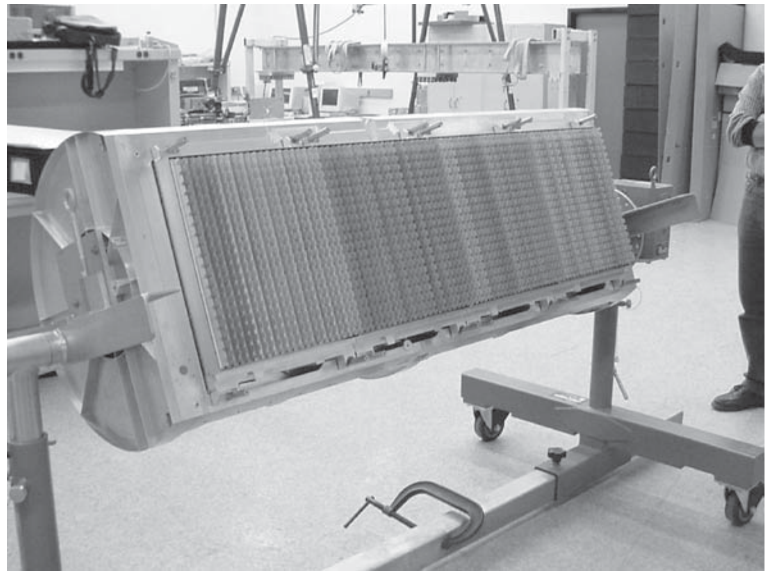
Because of the cancellation of the Roving Sands 2005 exercise, the MP-CDL program is examining other testing options for completing an operational assessment of the program in 2005. It is likely the testing will be less robust than expected at Roving Sands 2005. The integration of MP-CDL program onto the JSTARS test aircraft at Melbourne may be a solution.

Several operational issues need to be resolved in the MP-CDL program. These include data latencies, data throughput, network configuration changes, integration of MP-CDL onto individual platforms, and interference with other data links and communications devices. There is no Test and Evaluation Master Plan for the MP-CDL program and therefore, no approved test strategy. The MP-CDL test program is currently only ad hoc.

Multi-Platform Radar Technology Insertion Program (MP-RTIP)

SUMMARY

- The Multi-Platform Radar Technology Insertion Program (MP-RTIP) is developing a scalable sensor for use on both the E-10A and Global Hawk.
- The MP-RTIP sensor Test and Evaluation Master Plan focuses on developmental testing of the radar, deferring the operational testing of the radar until after it is incorporated into the E-10A and Global Hawk.



The purpose of the MP-RTIP program is to provide enhanced Wide Area Surveillance system capabilities to the warfighter, provide for a robust Global Hawk reconnaissance and surveillance capability, and enable NATO and allied Air-Ground Surveillance programs.

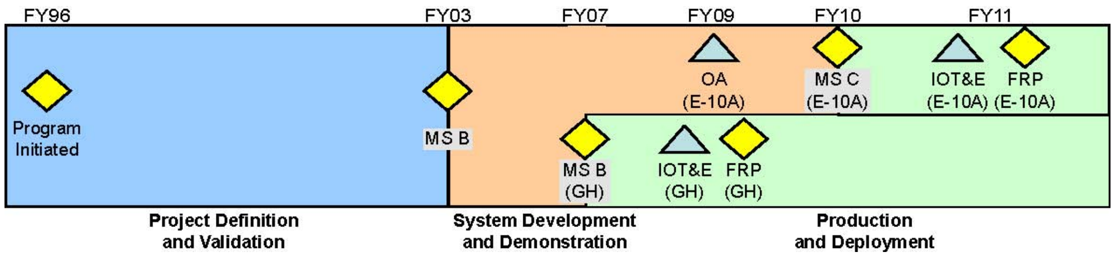
SYSTEM DESCRIPTION AND MISSION

MP-RTIP evolved from pre-planned product improvement to the E-8C Joint Surveillance Target Attack Radar System, designated the Radar Technology Insertion Program (RTIP). The Air Force restructured RTIP as MP-RTIP and the Office of the Secretary of Defense directed the program office to develop a scalable sensor for multiple platforms, including Global Hawk and a wide-body platform and also for NATO and allied Air-Ground Surveillance platforms. Additionally, the MP-RTIP program conducted an Analysis of Alternatives to determine whether to install the sensor on a Boeing 707 or on a newer aircraft. Using this analysis, the Air Force decided a Boeing 767-400ER best suited their needs for capability and growth, and designated it the E-10A.

The purpose of the MP-RTIP program is to provide enhanced Wide Area Surveillance system capabilities to the warfighter, provide for a robust Global Hawk reconnaissance and surveillance capability, and enable NATO and allied Air-Ground Surveillance programs. To that end, MP-RTIP will include the design of a modular, scalable two-dimensional electronically scanned array radar, and development, fabrication, and testing of MP-RTIP radars suitable for future integration on various airborne platforms. The piloted aircraft for Wide Area Surveillance will be the E-10A platform.

The MP-RTIP sensor consists of three architectural elements. These elements are the antenna, the radio frequency electronics, and the signal processor. The architectural elements allow for common interface definitions across the various host platforms. The MP-RTIP software can function independently of the physical location of the hardware that it is controlling. The software architecture is also host platform independent to the maximum extent possible. Co-developed by Northrop Grumman and Raytheon, a Radar Operating Services application provides a common interface between the common mode software and the hardware components.

TEST AND EVALUATION ACTIVITY



In December 2003, the Under Secretary of Defense for Acquisition, Technology, and Logistics signed an Acquisition Decision Memorandum authorizing the program's entry into System Development and Demonstration acquisition phase. After the completion of the Final Design Review for MP-RTIP, the program office updated the sensor Test and Evaluation Master Plan, as required by the Office of the Secretary of Defense.

TEST AND EVALUATION ASSESSMENT

MP-RTIP participation in operator-in-the loop events showed how MP-RTIP can contribute to the conduct of the air war. Information gained from the operator-in-the loop events will help scope future enhancements to the E-10A.

We should not underestimate the risk associated with the interdependency of these multiple Acquisition Category 1D programs (E-10A, MP-RTIP and Global Hawk). E-10A Spiral 1 is dependent on MP-RTIP to deliver its primary sensor. MP-RTIP is dependent on E-10A to provide a test platform for the sensor. Planned delivery of the two will need close coordination to ensure neither has to wait for the delivery of the other. Due to the scope and the long lead-times required for both programs, neither will be able to tolerate interdependent developmental delays without experiencing significantly increased costs.

National Airspace System (NAS)

The DoD NAS equipment must be capable of providing FAA-equivalent air traffic control services to civil and military aircraft.

SUMMARY

- DoD National Airspace System (NAS) testing includes two Multi-service Operational Test and Evaluation (MOT&E) events; MOT&E 3 for the end-to-end testing of the DoD NAS system-of-systems is in progress.
- Prior testing revealed effectiveness and suitability issues with the Digital Airport Surveillance Radar (DASR) and the DoD Advanced Automation System (DAAS).
- The NAS MOT&E 3 Test and Evaluation Master Plan and the MOT&E 3 test plan approved in June and July 2004, respectively, are adequate for evaluating the DoD NAS in the DoD operational environment.

SYSTEM DESCRIPTION AND MISSION

The DAAS and the DASR are components of the NAS modernization, a joint effort with the Federal Aviation Administration (FAA) to upgrade air traffic control (ATC) equipment supporting radar and approach control missions. According to the NAS Mission Need Statement developed by the Air Force Flight Standards Agency, the NAS supporting the Department of Defense must be fully interoperable with the FAA's modernization of NAS facilities. The DoD NAS equipment must be capable of providing FAA-equivalent ATC services to civil and military aircraft, avoiding mission delays or cancellations, maintaining flight safety; and limiting access to and controlling operations within special use airspace. Key elements of effective control of air traffic include establishing radar identification; establishing voice communications; separating, sequencing, and expediting aircraft; initiating or receiving handoffs; and providing additional services as stated in the FAA air traffic controller's handbook. The military operates within NAS to maintain and support the wartime readiness of air crews and air traffic controllers and maintainers. Continental United States ATC facilities prepare controller and maintenance personnel for wartime deployment and overseas and offshore assignments. The DoD NAS also includes the Voice Communication Switching System (VCSS), which received a full-rate production decision in November 1999. The NAS ties the air traffic controller, air crews, and ground personnel into a communications network. Together, the VCSS, DAAS, and DASR will provide interoperability with the FAA ATC systems and ensure that DoD ATC service supports civil and military operations, combat readiness training, and management of assigned airspace.

The FAA is the lead agency for the DAAS acquisition whereas the DoD is the lead agency for the DASR acquisition. The DoD and the FAA are jointly procuring the DAAS through the FAA's Standard Automation Replacement System program and are procuring the DASR though the DoD's contracting channels. The DAAS and the DASR will satisfy the DAAS requirements documented in the NAS Operational Requirements Document II.

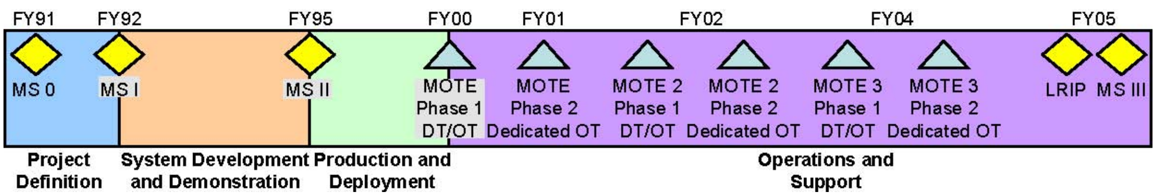
The Raytheon Corporation designed the DAAS to support the automation capabilities of ATC operations at Army, Navy, Air Force, and FAA airport control towers, at DoD radar approach control facilities, and at FAA Terminal Radar Approach Control facilities. The DAAS will replace outdated and difficult-to-maintain terminal automation systems, including the FAA's Automated Radar Terminal System and the DoD's Programmable Indictor Data Processor.

The DAAS receives and processes primary and secondary radar data, flight plans, weather and airport environmental data, and administrative information required for facility operations. It accepts data from airport surveillance radars and long-range radars. It also accepts from and provides data to the FAA's En Route Traffic Control Centers, to provide seamless coverage and flight management from takeoff at one airport to landing at a distant one.

The Raytheon Corporation designed the DASR to detect aircraft position and weather conditions in the vicinity of civilian and military airfields. The DASR, also known as the Airport Surveillance Radar 11 (ASR-11) system, will replace existing ASR-7, ASR-8, and AN/GPN-12, AN/GPN-20, and AN/GPN-27 systems. The DASR improves reliability, provides additional weather data, reduces maintenance costs, improves performance, and provides digital data to the DASR for presentation on controller radar displays.

The DASR Primary Surveillance Radar provides primary radar data ("skin paint") to control towers and radar approach controls. The DASR Monopulse Secondary Surveillance Radar (transponder beacon radar) provides identity and altitude data to control towers and radar approach controls. The Monopulse Secondary Surveillance Radar gives controllers rapid and accurate means of correlating radar targets displayed on the screen with the flight data plan.

TEST AND EVALUATION ACTIVITY



The DoD NAS MOT&E 3 is ongoing at Moody Air Force Base, Georgia. Operational Requirements Document II user-validated requirements guided development of the MOT&E 3 test program. MOT&E 3 results are to support the Milestone III decision.

TEST AND EVALUATION ASSESSMENT

The Air Force found the VCSS operationally effective, but not operationally suitable as a result of the VCSS DoD MOT&E in 1999. DOT&E reviewed corrective actions taken after the MOT&E and found them adequate to rectify the suitability shortcomings. The full-rate production decision was executed in November 1999.

The MOT&E concept for DAAS and DASR included two phases of testing, Phase 1 (developmental test/operational test) and Phase 2 (dedicated operational testing). DAAS and DASR have been through two rounds of MOT&E, conducted from October 1999 through September 2002. In each round of operational testing, the Air Force identified significant numbers of critical deficiencies, and while they eventually rated the DAAS operationally effective and operationally suitable in June 2001, the DASR was last rated by the Air Force as not effective and not suitable in a February 2003 MOT&E 2 status report.

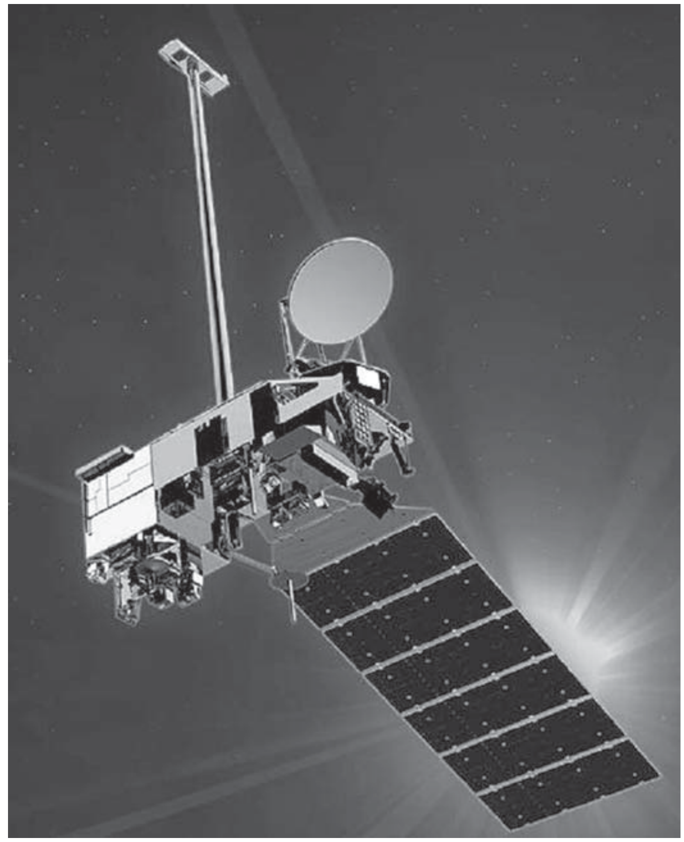
Based upon Milestone Decision Authority direction in November 2002, the Air Force Acquisition Executive, the NAS Program Office, and the Air Force developed a new way ahead for NAS, leveraging the results of FAA testing to the extent possible, and planning for another round of MOT&E with DoD production representative test articles in the DoD environment.

Since the MOT&E 3 is still ongoing, additional assessments at this time would be premature. Independent evaluation of MOT&E 3 results will form the basis of the DOT&E's beyond low-rate initial production report.

National Polar-Orbiting Operational Environment Satellite (NPOESS)

SUMMARY

- The National Polar-Orbiting Operational Environmental Satellite System (NPOESS) is making adequate progress as system plans mature.
- Concerns remain in the areas of testing, design, and requirements that warrant special attention as the program progresses.
- Test and evaluation activity this past year included completion of an operational assessment and refinement of test planning and documentation.



NPOESS will provide a national remote sensing capability to acquire and disseminate global and regional environment data.

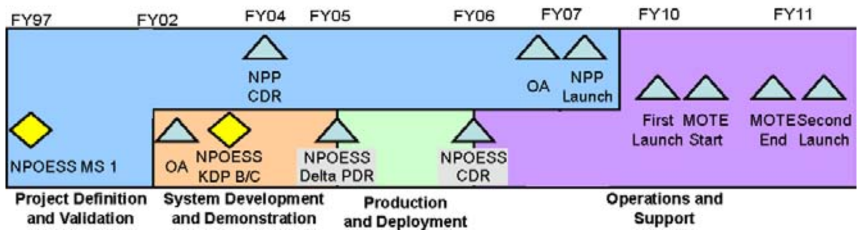
SYSTEM DESCRIPTION AND MISSION

The NPOESS architecture includes four major segments plus launch support. The four major segments are Space; Command, Control, and Communications (C3); Interface Data Processing; and Field Terminals.

The Space Segment consists of three satellites in sun-synchronous, near polar orbits with multiple, complex sensors that collect electromagnetic radiation in several bands. The C3 Segment provides all inter-segment communications to include routing of stored data to processing centers (Centrals) and routing of telemetry data to Mission Management Centers. The Interface Data Processing Segment (IDPS) consists of ground hardware and software at Centrals and software for use in Field Terminals. The IDPS converts raw sensor data into formats used to develop environmental, meteorological, and oceanographic products for weather users. The fixed and mobile Field Terminals are tactical systems designed to accept data directly from satellites and produce products needed by weather users. NPOESS provides capability for both civilian and military weather missions. Those NPOESS missions include aviation and space forecasts, ocean surface and internal structure forecasts for ship movements, search and rescue, and tropical storm reconnaissance and warnings.

NPOESS is a tri-agency program jointly administered by the DoD, the Department of Commerce's National Oceanic and Atmospheric Administration (NOAA), and the National Aeronautics and Space Administration (NASA). An NPOESS Executive Committee provides program management through an Integrated Program Office (IPO) with the Air Force as acquisition authority. NPOESS will provide a national remote sensing capability to acquire and disseminate global and regional environment data for a period of at least ten years. In 2003, the IPO restructured the program in response to funding constraints. A key risk reduction activity is the NPOESS Preparatory Project, which is a joint Integrated Program Office/NASA spacecraft with selected critical imaging and sounding sensor systems. As part of restructuring, the IPO delayed the Critical Design Review, NPOESS Preparatory Project launch, and the first potential NPOESS launch. Office of Secretary of Defense approval of the NPOESS Test and Evaluation Master Plan occurred in October 2002, with an update planned prior to the Critical Design Review in FY06.

TEST AND EVALUATION ACTIVITY



The Air Force Operational Test and Evaluation Center is the lead agency for all operational test and evaluation events, but will combine other Service operational test agencies, NOAA, and NASA efforts as appropriate to make efficient use of expertise and resources. The Air Force Operational Test and Evaluation Center completed the first part of an operational assessment and issued an Interim Summary Report in July 2002. The operational assessment completed in 2004 with a final report issued in December 2004 to support the April 2005 Delta Preliminary Design Review. The plan is for a new operational assessment to occur after the NPOESS Preparatory Project launch, currently planned for October 2006.

Test and evaluation efforts during this past year focused on planning to ensure that events synchronize with the program's restructure and that testing contributes to overall risk reduction and sound decision making. Activities in 2004 included publication of a Combined Test Force charter to define organizational roles and responsibilities, continuation of Direct Readout User Forum meetings to mature field terminal development and test planning, and meetings of the Test Planning Working Group to refine overall test planning and synchronize events.

TEST AND EVALUATION ASSESSMENT

NPOESS progress is adequate, but concerns remain in the areas of testing, design, and requirements that warrant special attention as plans continue to mature. In addition, the program's sensors, their integration, and algorithm development remain on a tight schedule and continue to face technical challenges.

Test-related concerns include Field Terminals and planning for Information Assurance testing. Field Terminal interoperability is one of the critical Information Exchange Requirements for the Interoperability Key Performance Parameter. Although the IPO is not responsible for developing Field Terminals, it plans to provide software and a demonstration terminal at each of two data rates to assist in terminal development by user agencies. In addition, risk reduction testing of individual agency Field Terminal prototypes should take place before launch, with terminals operationally interfacing with realistic NPOESS data sources in a controlled setting. Information assurance testing will be a focus area in the DOT&E evaluation, but is not addressed in the current NPOESS System Test Plan. The System Test Plan should incorporate information assurance, Electromagnetic Environmental Effects testing, and Air Force Satellite Control Network testing to support an integrated developmental and operational test program.

Design concerns relate to the Centrals, which were not designed to receive and process the magnitude of data expected from NPOESS. Furthermore, the models used by Centrals require modifications in order to match new NPOESS sensors. While these concerns are outside the IPO's control, allocation of resources for these improvements is critical to NPOESS success.

Requirements concerns involve differences between the system specification and Integrated Operational Requirements Document, and the lack of low-rate data thresholds. The cases of differences between the system specification and the Integrated Operational Requirements Document (such as the initial lack of space environment sensors on the first spacecraft and the potential lack of NPOESS satellite compatibility with the Air Force Satellite Control Network) require understanding and resolution so that developmental and operational testing goals are in consonance. In addition, the lack of adequate threshold definitions for low-rate data field terminal users will make it difficult to conduct integrated operational testing on low rate data terminals. The IPO has recently taken action to understand and address resolution of these differences.

NAVSTAR Global Positioning System (GPS)

The Air Force plans the first Block IIR-M satellite launch for early 2005.

SUMMARY

- The NAVSTAR Global Positioning System (GPS) test planning process continues through Air Force Operational Test and Evaluation Center working groups.
- The Block II/IIA and IIR satellites are continuing to successfully perform their navigation and timing mission for worldwide operational users.
- The Block IIR-M pre-launch satellite system tests will begin in April 2005 and the first Block IIR-M spacecraft launch is expected in mid 2005.

SYSTEM DESCRIPTION AND MISSION

NAVSTAR GPS is an Air Force-managed joint Service program that provides highly accurate, real-time, all weather, passive, common-reference grid position and time information to military and civilian users worldwide. It consists of three segments: space, control, and user equipment. The control segment consists of a master control station, four ground antennas, a pre-launch compatibility station, and six geographically dispersed monitoring stations. The monitoring stations monitor satellite downlink signals and upload corrections to diminish errors broadcast to users. The user segment consists of numerous types of GPS receivers that use satellite downlink signals to determine position, velocity, and precise time. These receivers are hosted on a multitude of platforms.

The space segment consists of a nominal 24-satellite constellation in semi-synchronous orbit. The Air Force Space Command has launched three blocks of NAVSTAR GPS satellites:

- Block I satellites (Developmental) – 11 satellites launched from 1982 through 1992. Satellite 7 experienced launch failure and was not usable.
- Block II/IIA – 9 Block II satellites launched between 1986 and 1990 and 19 Block IIA versions launched between 1990 and 1997. Improvements included radiation-hardened electronics, greatly increased navigation message data storage capacity, and selective availability and anti-spoof modes for more signal security.
- Block IIR – 9 satellites launched between 1997 and June 2004, with the first experiencing a launch failure. Block IIR satellites gained inter-satellite ranging capabilities, increased satellite autonomy and radiation hardness, and more launch responsiveness. There are nine additional Block IIR launches planned, with as many as eight of those being the modernized or Block IIR-M version.

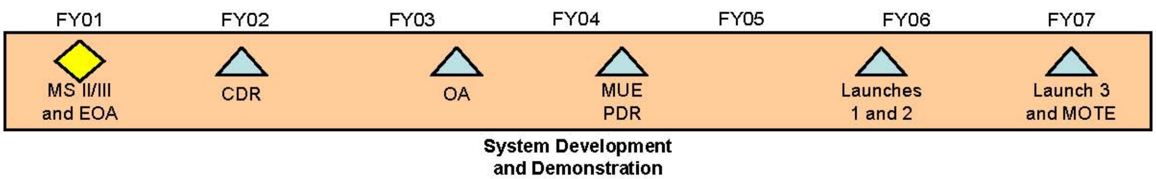
Future NAVSTAR GPS satellite blocks include:

- Block IIR-M – The Air Force plans the first Block IIR-M satellite launch for early 2005. The IIR-M capabilities include developmental military use-only M-code on the L1 and L2 signals and a civil code on the L2 signal.
- Block IIF – Also under development, with the first launch planned for mid-FY06. The Block IIF satellites are functionally equivalent to the IIR/IIR-M satellites and pave the way towards operational M-code after IOT&E in 2010. Block IIF will also add a new separate signal for civilian use, designated L5. This variant will also have increased, adjustable signal power.

The Air Force Operational Test and Evaluation Center conducted an operational assessment of the first Block IIR satellite in late 1997. Although the IIR satellite met all navigation and timing requirements, the report detailed a significant problem with the improved cross-link capabilities. The system program office has incorporated an interim fix for the problem on the second and third IIR satellites, and they are applying a more robust resolution to the remaining Block IIR/IIR-M satellite family.

Active user equipment programs include continuing Miniaturized Airborne GPS Receiver 2000 platform installations in FY03 and beyond; Defense Advanced GPS Receiver deliveries beginning in FY03; and M-code receiver deliveries beginning in FY10. All receivers produced after FY02 are to have the Selective Availability Anti- Spoofing module capability installed.

TEST AND EVALUATION ACTIVITY



FY04 activity included continued test planning meetings and combined developmental/operational testing of GPS Modernization backward compatibility with legacy user equipment. Future testing includes a series of combined developmental/operational testing events and operational assessments in support of the development and fielding of the new operational control system, the launch of the first IIR-M and IIF satellites, and M-code fielding. The next round of IOT&E will occur when 24 operational Block IIR-M and Block IIF satellites are on-orbit and M-code capable control segment software Version 6 is declared operational. IOT&E will be a system-wide test of the space and control segments and legacy and modernized (M-code capable) user equipment and is scheduled to take place in FY11.

TEST AND EVALUATION ASSESSMENT

Control segment software development continues to be a moderate to high-risk area with an ambitious schedule. The Test and Evaluation Master Plan and associated test planning documents are undergoing revision by the GPS test community to accommodate the introduction of variable satellite signal power settings and increases in signal strength. DOT&E believes that fielding the new operational control system and M-code availability warrant not just combined developmental/operational testing, but dedicated operational test events.

DOT&E continues to advocate the testing of new and legacy GPS receivers as early in the program as possible. These receivers must be integrated into representative platforms (e.g., ships, aircraft, and land vehicles) and tested in operational environments. Development of M-code-capable user equipment lags behind the development of the space and control segments, and this may induce delays in testing the Block IIR-M and IIF systems, along with the attendant M-code and civil signal user capabilities. Before that time, testing of backward compatibility will use legacy receivers and initial M-code testing will use prototype receivers.

RQ-4 Global Hawk Unmanned Aerial Vehicle (UAV)

The Global Hawk UAV operates at high-altitude with long range and long endurance.

SUMMARY

- Operational deployments, late deliveries of air vehicles and sensors, and slow development of sensor and mission software resulted in deferral of the operational assessment from FY04 to 2QFY05.
- The Air Force plans to continue to purchase and field Global Hawk systems without conducting and reporting the results of the operational testing outlined in the Test and Evaluation Master Plan (TEMP).
- The Air Force must submit a new TEMP with a new test strategy to account for program delays and reduce risk to the user.

SYSTEM DESCRIPTION AND MISSION

The RQ-4 Global Hawk Unmanned Aerial Vehicle (UAV) system is a theater commander's asset designed to satisfy surveillance and reconnaissance shortfalls. The Air Force intends the Global Hawk air vehicle to provide high-resolution Synthetic Aperture Radar and Electro-Optical/Infrared imagery, as well as signal intelligence data at long range with long loiter times over target areas. Potential missions for the Global Hawk cover the spectrum of intelligence collection capabilities to support joint combatant forces in worldwide peace, crisis, and wartime operations.

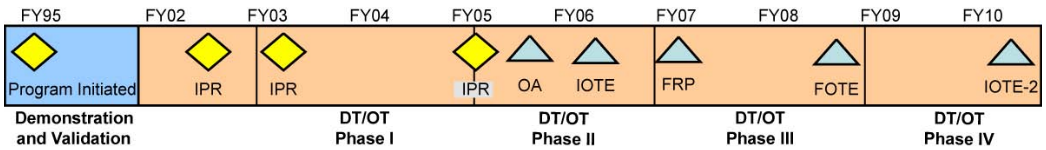
The Global Hawk UAV system consists of an air vehicle component with air vehicles, sensor payloads, avionics, and data links; a ground segment with a launch and recovery element; a mission control element with embedded ground communications equipment; a support element; and trained personnel.

The Global Hawk air vehicle operates at high-altitude with long range and long endurance. It must provide 28 hours endurance while carrying 2,000 pounds (RQ-4A) or 3,000 pounds (RQ-4B) of payload and operating at 60,000 feet mean sea level. Each of the sensors provides wide area search imagery and a high-resolution spot mode. The radar also has a ground moving target indicator mode. Prior to the Initial Operational Test and Evaluation (IOT&E) in FY06, production aircraft will have an initial signal intelligence capability. The program plans include a more capable Airborne Signals Intelligence Payload prototype, available for operational testing prior to the full-rate decision. The Air Force intends for a follow-on operational test and evaluation of the production system. The program will integrate the Multi-Platform Radar Technology Insertion Program radar and test it in a second IOT&E.

Global Hawk operates autonomously using a satellite data link (either Ku-band or UHF) for sending sensor data from the aircraft to the mission control element. The common data link directly down-links imagery when the UAV is operating within line-of-sight of users with compatible ground stations. The ground segment consists of the mission control element for mission planning, command and control, and image processing and dissemination; the launch and control element for controlling launch and recovery of the UAV; and associated ground support equipment. By having separable elements in the ground segment, the mission control element and the launch and control element can operate in geographically separate locations. The user may then deploy and locate the mission control element with the supported

command's primary exploitation site. Military shelters with external antennas for line-of-sight and satellite communications with the air vehicles contain both ground segments.

TEST AND EVALUATION ACTIVITY



The March 2003 TEMP provides for an FY04 operational assessment, IOT&E in FY06, follow-on operational test and evaluation on the full-signal intelligence system, and a second IOT&E on the Multi-Platform Radar Technology Insertion Program configuration. The Air Force intended to conduct combined phases of developmental test/operational test between dedicated operational test events. These systems-level developmental test/operational test evaluations were intended to support yearly Configuration Control Board decisions on technology integration into production lots, as well as entry into operational testing.

The Air Force did not execute the test strategy in FY04. There were no operational test events during FY04. The scheduled operational assessment did not occur because of delays in the delivery of sensors, software, and source data (required for developing technical orders and training courseware). The Air Force does not plan operational scenarios until the end of the current developmental test/operational test phase, projected to end in February 2005. At that time, they plan to conduct Integrated System Evaluation flights. These may provide the first end-to-end system-level evaluation of production-representative mission capability. In the meantime, the contractor will continue to deliver production air vehicles. The FY04 operational assessment was to be a dedicated, robust evaluation that provides an independent mission-level evaluation of the capability first fielded to the user. DOT&E has not yet received an adequate plan for the operational assessment, now scheduled for early FY05.

Developmental testing during FY04 included data acquisition for Synthetic Aperture Radar development, testing of the Spiral 1 Electro-Optical/Infrared/Synthetic Aperture Radar air data system, and communications using the test air vehicle. The test team demonstrated JP-8+100 fuel compatibility and a "see and detect" capability to improve situational awareness during launch, recovery, and ground operations using an infrared nose camera. Flight testing also characterized reported deficiencies in Air Traffic Control voice quality to help identify root causes. A technical order validation and verification effort examined the accuracy and usability of maintenance job guides. Ground testing of the new Automatic Contingency Generation software has also been ongoing in the 6-Degree Of Freedom simulators.

In addition to the Spiral 1 development efforts, flight testing supported a number of other activities. The contractor integrated and tested the Advanced Information Architecture payload. This payload provides storage and data links on the aircraft that allows users with line-of-sight to the aircraft to download stored imagery. A European aeronautic defence and space company signal intelligence sensor was integrated and its capability demonstrated during a deployment to Germany.

The contractor delivered Air Vehicles 9, 10, and 11 (designated AF-2, AF-3, and AF-4, respectively). Air Vehicle 9 participated in the technical order validation and verification effort. Air Vehicles 10 and 11 only underwent production acceptance flight tests.

TEST AND EVALUATION ASSESSMENT

The program encountered unexpected difficulty in the development of the Airborne Synthetic Aperture Radar System Improvement Program Synthetic Aperture Radar modes. This delayed testing of the Spiral 1 sensor. The first flight test of the integrated Spiral 1 sensor took place on August 25, 2004.

Significant developmental/operational testing remains before an operational assessment can take place:

- Testing to verify image quality and geo-location accuracy.
- Automatic Contingency Generation capability—a significant change that the user needs to meet requirements for rapid mission planning.
- Manual Collection Management software, which provides the ability to manually re-task a sensor in real-time, will also be delivered and tested.

The program cannot execute the test strategy in the current TEMP. Delays in development and slips to significant test events will require a new test strategy and a new TEMP. The decoupling of production and fielding decisions to both testing and the progress of development contributes to a schedule-driven approach. This puts the user at increased risk of not being able to accomplish the mission.

RQ/MQ-1 and MQ-9 Predator Unmanned Aerial Vehicle System

The user plans to use MQ-9 in an armed reconnaissance ("hunter-killer") mission to find, identify, and kill targets.

SUMMARY

- In February 2004, the Air Force Program Executive Officer approved entry into Increment 1 System Development and Demonstration. Milestone B in fall 2004 is contingent on the delivery of an approved Capabilities Description Document and Test and Evaluation Master Plan.
- The Air Force plans to purchase 23 of 55 total air vehicles and field a limited number prior to the FY07 Initial Operational Test and Evaluation (IOT&E) and full-rate production decision in FY08.
- The Air Force proposes no dedicated operational test prior to IOT&E.

SYSTEM DESCRIPTION AND MISSION

The RQ/MQ-1 Predator is a medium-altitude unmanned aerial vehicle intended to provide reconnaissance, surveillance, and target acquisition support to a theater, as well as a limited strike capability. Originally designated RQ-1, the Air Force changed the designation to MQ-1, acknowledging the system's multi-role capability. The RQ-1 underwent IOT&E in 2001 and the one-hundredth RQ/MQ-1 was delivered in FY04.

The Air Force plans for the MQ-9 to fly higher and faster, provide more power, and carry larger payloads than the original Predator system. To do so, it must include a more robust airframe and power plant. The user plans to use MQ-9 in an armed reconnaissance ("hunter-killer") mission to find, identify, and kill targets. Reconnaissance, surveillance, and target acquisition is a secondary mission. The combination of intelligence, surveillance, and reconnaissance capability and the ability to engage with onboard weapons or coordinate off-board strike assets should increase the probability of detecting - and successfully attacking - time sensitive targets.

The Air Force built two prototypes, designated YMQ-9, but they do not have the desired payload capacity. Subsequent air vehicles will have an increased gross takeoff weight along with added payload capacity, more thrust, and triple redundant avionics.

The ground station provides command and control of the air vehicle through pilot stations. The operator flies the air vehicle using stick and rudder control. The ground station also provides mission planning, communications, targeting, and imagery dissemination. The ground station must present the operator a coherent picture utilizing onboard systems, off-board data, and automatic target cueing. The program plans ground station commonality with MQ-1 for logistics purposes.

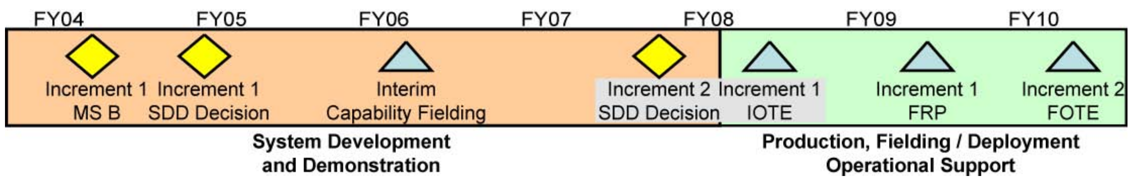
The current Air Force strategy anticipates incremental delivery of capability. Increment 1 of System Design and Development will incorporate improved sensor, communications, stores management, and ground station systems intended to provide an integrated system for accomplishing the hunter-killer mission. An IOT&E in 2007 and a full-rate production decision in 2008 will follow Increment 1 System Design and Development. Concurrent with Increment 1

System Design and Development, some early air vehicles will employ laser-guided and GPS-guided 500-pound bombs (GBU-12 and GBU-38, respectively). These air vehicles will use existing sensors integrated with the MQ-1 ground station. Initial systems developed in 2004 will be capable of GBU-12 only; and interim systems developed in 2005 and delivered to Air Combat Command in 2006 will deliver both GBU-12 and GBU-38.

The contractor will complete the production of 16 aircraft that have some mission capability (initial, interim, or Increment 1 capability) and the Air Force will contract for 23 total air vehicles before the IOT&E. The Air Force plans to retrofit the remaining air vehicles to Increment 1 capability following IOT&E.

The Air Force plans to proceed to Increment 2 before the end of IOT&E, and before the delivery of the beyond low-rate initial production report on Increment 1.

TEST AND EVALUATION ACTIVITY



YMQ-9 Number 3, which has the higher takeoff weight capacity, greater thrust, and triple-redundant avionics, first flew on October 17, 2003.

During FY04, developmental testing accumulated over 100 sorties and 250 flight hours. The primary objectives of the testing were integration of the LYNX Synthetic Aperture Radar, Multispectral Targeting System-B, and GBU-12, as well as flight performance testing. An MQ-9 also carried and released a Silent Eyes Micro unmanned aerial vehicle that delivered imagery through the MQ-9 to a ground station.

The Air Force accepted three new aircraft (numbers 3, 4, and 5) in FY04. These are the first vehicles intended to meet the Air Force's payload requirement.

The Air Force plans to submit a Test and Evaluation Master Plan to the Office of the Secretary of Defense for approval in November 2004.

TEST AND EVALUATION ASSESSMENT

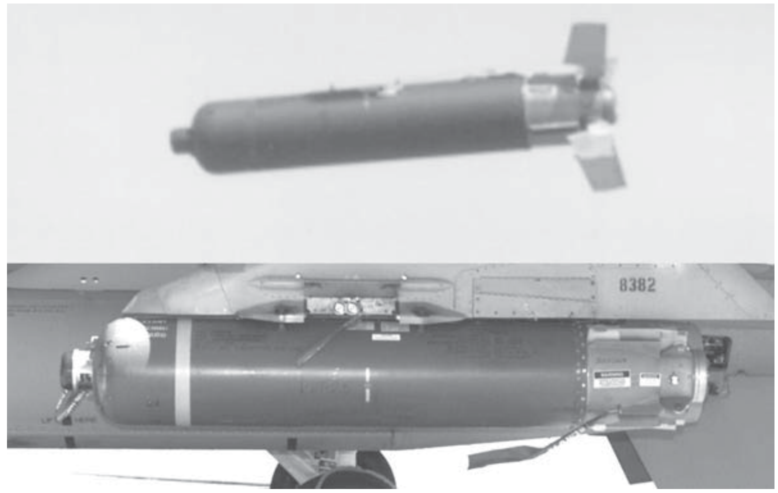
The early, rapid procurement of air vehicles and limited fielding to the user calls for early, rigorous operational testing. However, the Air Force does not plan to conduct any dedicated operational testing until FY07. The Air Force briefed DOT&E that it plans to have the Air Force Operational Test and Evaluation Center write an operational assessment in FY05. If completed, this operational assessment would not be based on a dedicated test event. It would be an operational test agency report on its evaluation of developmental test activities. Although the Air Force Operational Test and Evaluation Center expects to have some input into test conduct, there is no dedicated period of operational testing, funding, nor acquisition or fielding decision dependent on the event. The current test strategy does not identify specific operational assessment objectives, scope, or resources.

The user will take delivery of numerous MQ-9 systems and may deploy them into combat operations before the Air Force conducts dedicated, independent operational testing and evaluation.

Sensor Fuzed Weapon (SFW)

SUMMARY

- The Sensor Fuzed Weapon (SFW) Preplanned Product Improvement (P^{3}I) demonstrated satisfactory performance and met all requirements.
- Developmental testing of the SFW P^{3}I with a longer delay for submunition chute opening under the Wind-Corrected Munition Dispenser-Extended Range program demonstrated an average number of kills per target that exceeded the requirement value.



The SFW P^{3}I System demonstrated satisfactory performance and met all requirements in FY02.

SYSTEM DESCRIPTION AND MISSION

The CBU-97 SFW is a 1,000 pound class, unpowered, air-delivered, wide-area smart munition intended to provide multiple kills per pass against armored and support vehicles. The system is certified on the A-10, B-1, B-2, B-52, F-15, and F-16 aircraft. It is designed to be compatible with various United States Navy, Marine Corps, and NATO aircraft. The weapon is capable of delivery in adverse weather conditions, day or night, at various altitudes and airspeeds. SFW consists of a SUU-66/B Tactical Munitions Dispenser that houses ten BLU-108 sub-munitions. Each sub-munition contains four projectiles, an orientation and stabilization system, a radar altimeter, and a rocket motor. After spin-up and release from the sub-munitions, the projectiles scan the area under their flight path with a two-color passive infrared sensor. The P^{3}I projectile also incorporates an active laser range finder. Upon detecting a valid target, an electronic pulse detonates a charge driving an explosively formed penetrator into the target.

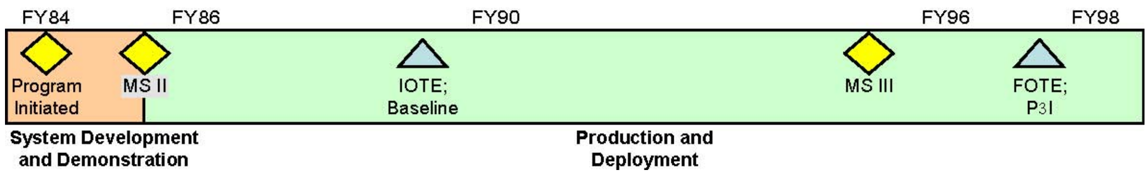
The SFW can be delivered at low or high altitudes and from low to supersonic speeds. High altitude deliveries are more precise when the SFW is configured with the Wind-Corrected Munitions Dispenser tail kit. The Wind-Corrected Munitions Dispenser is an inertial guidance tail kit that replaces the existing tail section of current tactical munitions dispensers to improve delivery accuracy when released from medium to high altitude. The retrofitting of SFW with Wind-Corrected Munitions Dispenser tail kits began in April 2001 and is designated the CBU-105.

In 1996, the Air Force instituted an SFW P^{3}I program, which implements three major improvements: performance against countermeasures, performance against softer targets without degrading current target-set performance, and increased area coverage. The sensor is upgraded to enhance its performance against cooler targets and improve weapon aim-point accuracy. The SFW P^{3}I sub-munition is designated BLU-108B/B and the all-up-round is designated the CBU-105B/B with the Wind-Corrected Munitions Dispenser tail kit. DOT&E approved the current Test and Evaluation Master Plan, which covers testing of SFW P^{3}I, in August 2000.

All tests contributing to LFT&E of the SFW P^{3}I concluded in FY01. DOT&E provided Congress with an LFT&E report on system lethality in March 2002.

The Air Force approved production of the SFW P^{3}I in January 2001. The Wind-Corrected Munitions Dispenser Milestone III was approved in February 2001. No further acquisition milestones are planned for SFW.

TEST AND EVALUATION ACTIVITY



SFW P^{3}I developmental test/operational test weapon deliveries are complete. The Air Force completed all testing on the P^{3}I System in accordance with the Test and Evaluation Master Plan.

Production verification tests leading to the acceptance of production deliveries are conducted annually. Single weapon tests in November 2003, February 2004, and August 2004 confirm production weapons continue to meet requirements.

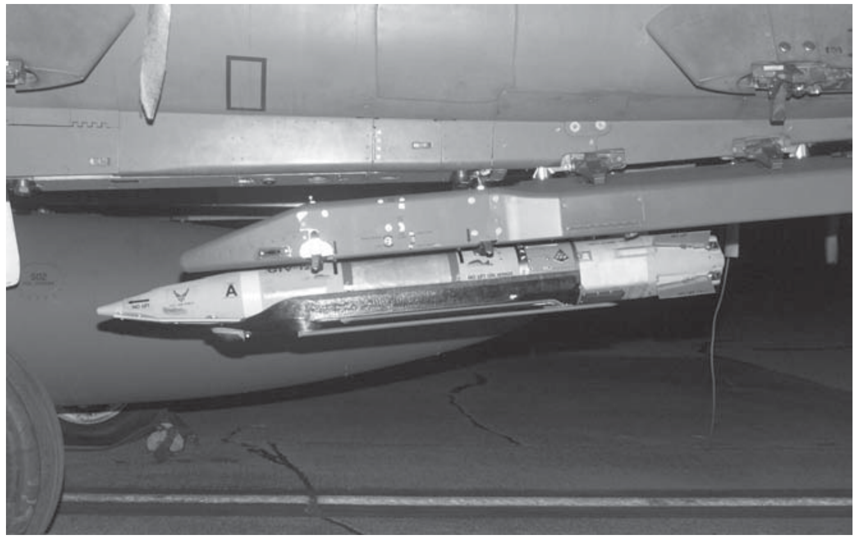
Development of a Wind-Corrected Munition Dispenser- Extended Range variant, planned as a cut-in to the current SFW P^{3}I production line, included an increased time delay for submunition chute opening. The Air Force tested the SFW P^{3}I with this longer time delay by releasing a single weapon against the same target array used during SFW P^{3}I operational testing. Developmental testing of this time delay increase occurred in February 2004.

TEST AND EVALUATION ASSESSMENT

The SFW P^{3}I System demonstrated satisfactory performance and met all requirements in FY02.

Under the Wind-Corrected Munition Dispenser- Extended Range program, developmental testing of the SFW P^{3}I with an increased delay for submunition chute opening appear to indicate continued achievement of system requirements. The requirement for average number of kills per target was exceeded during testing.

Small Diameter Bomb (SDB)


In a non-GPS jamming environment, SDB free-flight performance utilizing the Accuracy Support Infrastructure continues to demonstrate the ability to meet accuracy requirements.

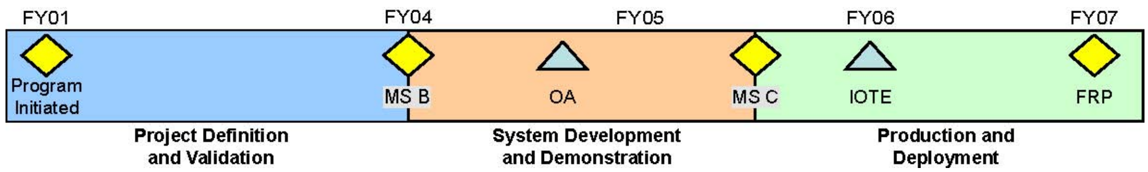
SUMMARY

- The Small Diameter Bomb (SDB) entered System Development and Demonstration on October 17, 2003, coinciding with the approval of the Test and Evaluation Master Plan.
- An operational assessment began in August 2004 and will conclude in FY05.
- Developmental weapon flight tests indicate SDB continues to meet accuracy requirements, although only in a non-Global Positioning System (GPS) jamming environment.
- Free-flight operations in a GPS-denied environment under realistic combat conditions are necessary to confirm ground test results.
- Fuze system anomalies were discovered during flight tests and sled tests in FY04. Follow-on sled tests demonstrated proper function of fuze system redesign. To confirm that shortfalls in fuze function performance are resolved, all remaining test program sled and free-flight weapons testing with live fuzes must be completed.
- To confirm SDB effectiveness and suitability against the required target set, the Air Force must conduct free-flight testing of fully-functioning, production-representative weapons in a field test under realistic combat conditions against targets that are fixed, and against targets that are fixed during weapon time of flight but have relocated after mission planning is complete but prior to weapon release.
- IOT&E should begin in October 2005.

SYSTEM DESCRIPTION AND MISSION

The SDB, produced by the Boeing Company for the Air Force, is a 250-pound class, air-launched weapon using deployable wings to achieve standoff range. The Air Force is developing the SDB to provide increased weapon loadout per aircraft for employment against offensive counterair, strategic attack, interdiction, and close air support targets. A differential GPS signal, transmitted through the launch platform prior to weapon release provides a near-precision navigation solution against targets that are fixed during weapon time of flight. This differential system is referred to as the Accuracy Support Infrastructure. The Air Force anticipates the SDB system will possess a GPS anti-jam and anti-spoof capability. The SDB warhead is a penetrator design with an added blast/fragmentation capability. The warhead uses the same explosive fill as on the Joint Air-to-Surface Standoff Missile. Fuzing of the warhead is initiated by either contact, reaching a preset height above the intended target, or by achieving a specified delay after warhead impact. The SDB is employed from a four-place carriage mounted to the aircraft. Initial integration of the SDB is with the F-15E. Follow-on integration may occur with the F/A-22, F-35, J-UCAS, F-16 (Block 30/40/50), F-117, A-10, MQ-9, B-1, B-2, and the B-52. An additional SDB increment is planned to conduct attack against specified moving targets.

TEST AND EVALUATION ACTIVITY



Since entry into System Development and Demonstration, the Air Force has conducted ground tests of the weapon, carriage, container system, and weapon components to evaluate system performance under anticipated field, environmental, and aerodynamic stress. Ground testing was also conducted to evaluate the performance of the weapon's GPS hardware and software in a simulated GPS jamming environment.

Free-flight weapon testing consisted of single-weapon releases against point, non-threat representative targets. Free-flight testing is facilitating the evaluation of release conditions, in-flight performance, impact parameters, fuze function, and guidance and navigation accuracy. It will also be used to confirm weapon flight path modeling accuracy. Testing is also supporting the evaluation of reliability, availability, maintainability, and supportability of the SDB system.

The contractor conducted several sled tests to investigate anomalies discovered during the first Live Fire sled test. Sled tests will evaluate weapon penetration capability and fuze function after penetration. Three arena warhead characterization tests provided warhead performance data to support the development of the Joint Munitions Effectiveness Manual.

An operational assessment of the potential operational effectiveness and potential operational suitability of the SDB weapon system will examine all testing results of SDB systems. The operational assessment concludes in FY05.

TEST AND EVALUATION ASSESSMENT

Based on developmental test results, modeling of SDB free-flight weapon release events appears predictive. The full complement of production-representative SDB weapon free-flight tests are necessary to confirm free-flight model profile predictive capability.

Ground tests continue to identify shortfalls in the SDB design. However, additional testing after component re-design demonstrates the SDB is progressing toward meeting requirements. Although GPS hardware demonstrates the potential to resist GPS jamming during ground tests, testing of the SDB system during free-flight operations in a GPS-denied environment under realistic combat conditions is necessary to confirm these ground test results.

In a non-GPS jamming environment, SDB free-flight performance using the Accuracy Support Infrastructure continues to demonstrate the ability to meet accuracy requirements. However, the fuze demonstrated shortfalls revealed in both sled and free-flight developmental test events.

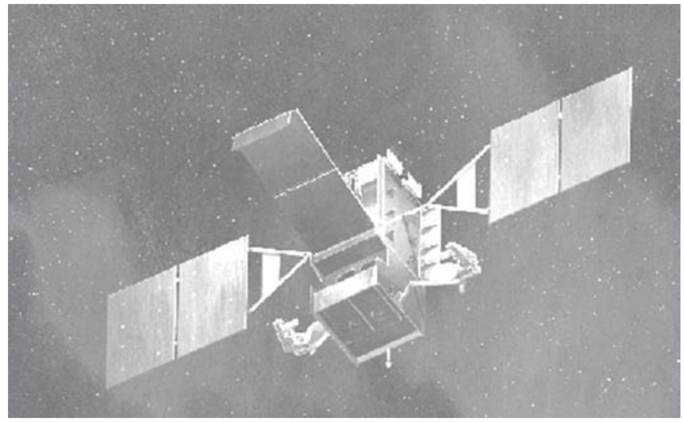
Sled testing conducted at the close of FY04 to evaluate fuze system modifications demonstrates fuze function as required. To confirm fuze function performance shortfalls are resolved, all remaining test program sled and free-flight weapons testing with live fuzes must be completed. Sled test results will contribute to lethality assessment along with data from free-flight tests in developmental and operational testing.

To confirm SDB effectiveness and suitability against the required target set, the Air Force must conduct free-flight testing of fully-functioning, production-representative weapons. These tests include a field test under realistic combat conditions against targets that are fixed, and against targets that are fixed during weapon time of flight but have relocated after mission planning is complete but prior to weapon release.

Space Based Infrared System (SBIRS) High

SUMMARY

- The Space Based Infrared System (SBIRS) control segment, operating with Defense Support Program (DSP) satellites, continues to demonstrate improved performance over the earlier DSP ground system.
- The Highly Elliptical Orbit (HEO) payload tests demonstrated that the payloads meet acceptable electromagnetic interference limits, and the first HEO shipped to the host.
- Concerns remain with requirements definition, concepts of operation, definition of operational dependability, software maturity, concurrency between space and ground segment development, and the operational impact of any further program delays.



SBIRS improves capability for Combatant Commanders, deployed U.S. forces, and allies.

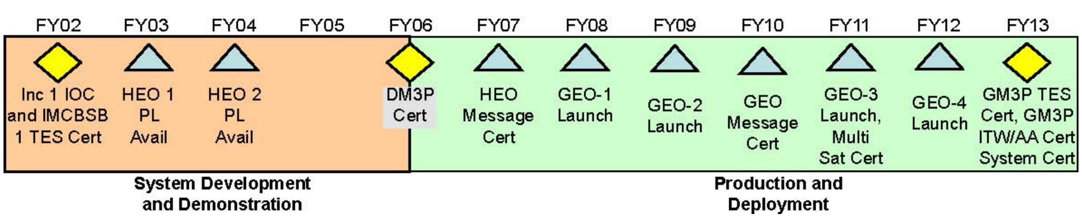
SYSTEM DESCRIPTION AND MISSION

SBIRS replaces the current DSP system. SBIRS improves capability for Combatant Commanders, deployed U.S. forces, and allies by providing better data quality and timeliness in four mission areas: missile warning, missile defense, technical intelligence, and battlespace characterization.

SBIRS acquisition includes two increments. Increment 1, which attained Initial Operational Capability in December 2001, consolidated DSP and Attack and Launch Early Reporting to Theater ground stations into a U.S. mission control station. Increment 1 operates with DSP satellite data. Increment 2 develops software and hardware to operate SBIRS satellites. SBIRS includes two hosted payloads in HEO, with first delivery in 2004, and four satellites in Geosynchronous (GEO) orbit, with first launch in 2006. A fifth GEO satellite will be a replenishment/spare.

SBIRS Increments 1 and 2 entered the Engineering and Manufacturing Development phase following a Milestone II Defense Acquisition Board review in October 1996. In 2002, the Air Force restructured the program due to schedule and cost overruns. In the restructure, the first GEO satellite launch shifted from 2004 to 2006 with ground segment incremental deliveries rescheduled to align with revised satellite schedules.

TEST AND EVALUATION ACTIVITY



Test and evaluation activity during 2004 involved continuing identification and resolution of HEO problems, test tool development, and revision of the Test and Evaluation Master Plan to realign the test concept and events with the revised program schedule and content.

HEO payload tests demonstrated that the payloads met acceptable electromagnetic interference limits, and the first HEO shipped to the host. The second HEO shipment occurs in early FY05. Detailed planning is underway for an extensive set of ground and space end-to-end tests once the HEO payloads are on-orbit.

Test tool development focused on threat scenario simulations and test message injectors. DSP-capable Mobile Multi-Mission Processors are to replace the Army's Joint Tactical Ground Station. Testing of Mobile Multi-Mission Processors in 2005 requires tactical scenario development. Testing of GEO-capable mission processing beyond 2006 requires a new simulation tool and message injector, called Simulation Over Recorded Data, which is under development to augment observed targets of opportunity and to simulate large missile attacks.

Test planning focused on a revision to the current Test and Evaluation Master Plan and test strategy to reflect the current spiral acquisition strategy and program baseline. The SBIRS spiral strategy builds around ten spiral "effectivities," or capability deliveries, with each requiring operational testing. Two of the effectivities are complete (an Interim Mission Control Station Backup in 2002 and an Integrated Training Suite in 2003), while the remaining eight stretch through 2010. Two require testing in 2005: HEO Message Certification, and the Army's DSP-capable Mobile Multi-Mission Processor Theater Event System Certification. GEO Message Certification occurs in 2007.

TEST AND EVALUATION ASSESSMENT

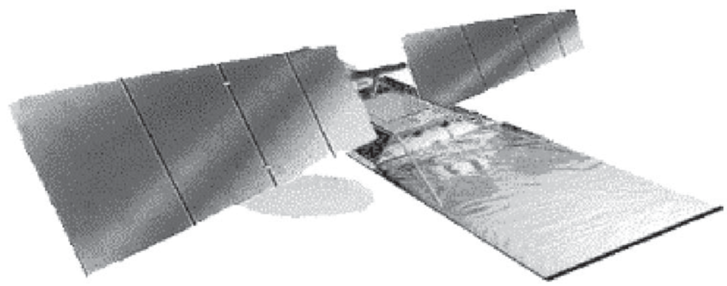
The SBIRS control segment, operating with DSP satellites, demonstrates improved performance over the earlier DSP ground system. As SBIRS satellites begin deployment, the test and evaluation focus will shift from DSP-based operations to the new operational capabilities provided by SBIRS. Plans call for delivery and testing of these capabilities incrementally though 2010. Although test planning is progressing satisfactorily, several areas of concern remain: requirements definition, concepts of operation, and definition of operational dependability. Requirement definition must precede each effectivity to provide for test planning and evaluation of test results, but at this time only the DSP-capable Mobile Multi-Mission Processor effectivity and the end system have well-defined requirements. The concepts of operations used during developmental and operational testing should be the same, but at present there are differences between the two. Operational dependability has a standard definition involving operational uptime and downtime, but SBIRS developmental testing uses a different method and needs to be reconciled with the standard definition.

Besides these specific concerns, DOT&E remains concerned with ongoing software maturity problems, the degree of concurrency between space and ground segment development, and the operational impact of any further program delays.

Spaced Based Radar (SBR)

SUMMARY

- Space Based Radar (SBR) test and evaluation planning is proceeding at an adequate pace to provide an assessment of operational effectiveness and suitability.
- During Phase A, the test and evaluation strategy should focus on the mitigation of key risk areas.
- The initial Test and Evaluation Master Plan (TEMP) should emphasize developmental testing, with a well-structured path towards operational testing, based on an understanding of the SBR program at Key Decision Point (KDP)-B.



SBR improves near real-time targeting and situational awareness.

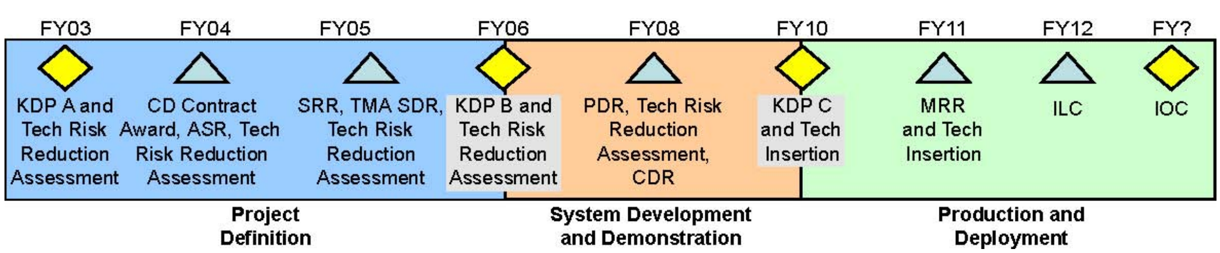
SYSTEM DESCRIPTION AND MISSION

The SBR system is a planned constellation of satellites that can be tasked in near real-time to provide a rapid response to real-time Combatant Commander requirements. Moving Target Indicator data and Synthetic Aperture Radar imagery will transmit directly, or via relay satellites, to earth receiving stations. SBR information users include Air Expeditionary Forces, Army objective forces, naval forces, intelligence components, and Homeland Security networks. Fused with current Moving Target Indicator systems data, SBR improves near real-time targeting and situational awareness.

The Secretary of Defense appointed the Secretary of the Air Force as the DoD Executive Agent for Space in 2002. The Air Force is acquiring SBR under new DoD National Security Space Policy directives tailored for space programs. SBR is in the initial phase of development, and passed its first Key Decision Point A (KDP-A), to enter Phase A (the Concept Study Phase) in July 2003. The purpose of this study phase is to develop concepts and architectures to a sufficient level of maturity to enter the KDP-B Design Phase. The study phase consists of further concept definition, concept of operations, requirements development, risk reduction, and initial planning to develop a test and evaluation strategy prior to KDP-B. After KDP-B, the program should enter a system pre-acquisition period lasting through a planned KDP-C, when system acquisition activities will begin.

The System Program Office accomplishments include formulation of a draft acquisition strategy and award of key contracts to support ongoing risk reduction activities.

TEST AND EVALUATION ACTIVITY



Test activity during 2004 focused on development of a Combined Test Force charter that defines agency roles and responsibilities for testing, and maturing a test strategy document that will serve as the basis for a TEMP. The test

strategy document emphasizes combined developmental and operational testing in order to maximize testing efficiency, and addresses critical operational issues, measures of effectiveness, and measures of performance.

TEST AND EVALUATION ASSESSMENT

SBR is at an early stage, but test and evaluation planning proceeds at an adequate pace to support an assessment of operational effectiveness and suitability. During Phase A, the test and evaluation strategy should focus on the mitigation of key risk areas. Generally these areas involve:

- Information management.
- The capability of the system to manage very large amounts of expected data.
- Satellite on-board processing capability and reliability needed to "pre-digest" the collected radar data before transmitting to ground.
- The ability of signal processing algorithms to present radar-derived data for rapid analysis and dissemination.
- Spacecraft technology in terms of power, structural integrity, and detection technology.
- Communications reliability and system survivability.

The initial TEMP should emphasize developmental test, with a well-structured path towards operational test, based on an understanding of the SBR program at KDP-B. Because the Air Force has selected two contractors for competition in the Concept Development Phase A, the government test communities need to be aware of both concepts - and interact with - developmental test and operational test representatives from both contractors. At KDP-B, the TEMP should include separate appendices, marked for government use only, prepared by each contractor. These appendices should reflect individual contractor test concepts. The government and each of the two contractors are developing test concepts according to their own set of Critical Operations Issues. Although each contractor should follow their own Critical Operations Issues, the government should ensure they cover the parameter space indicated by the government.

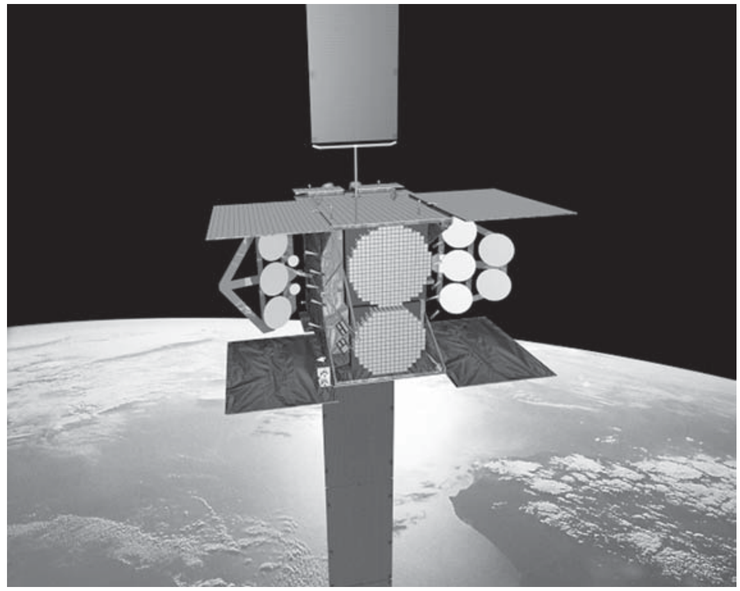
The current Test Strategy for the Air Force Operational Test Center consists of over 2,500 test events, most of which are projected to be covered by developmental test activities. The magnitude of the testing program envisioned for SBR underscores the need for combined developmental/operational testing as an efficient and effective strategy for performing SBR testing.

Current budget reductions will cause delays in SBR development; however, the TEMP's general test concepts objectives should remain fixed.

Wideband Gapfiller Satellite (WGS)

SUMMARY

- The system test planning process continues through the Air Force Operational Test and Evaluation Center and Army-sponsored working groups.
- The test "insight" process following a commercial approach is not currently yielding adequate test information 15 months prior to launch of the first satellite.
- Areas of continued interest include platform and payload control, evaluation of satellite capacity, and anti-jam survivability.



The test results and analysis presented at the Critical Design Review indicate the design is progressing with no major problems.

SYSTEM DESCRIPTION AND MISSION

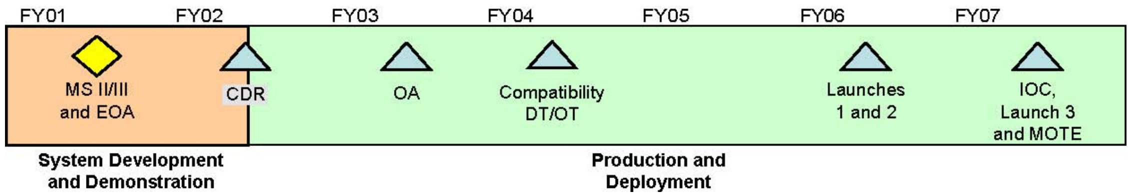
The Wideband Gapfiller Satellite (WGS) system will provide communications to U.S. warfighters, allies, and coalition partners during all levels of conflict short of nuclear war. It is the next generation wideband component in the DoD's future Military Satellite Communications architecture.

WGS will satisfy military needs by providing communications in both the X-band and military Ka-band frequencies. It will combine capabilities onto a single satellite for tactical X-band communications, augment the Global Broadcast Service (GBS) Phase II system, and provide new two-way Ka-band services. The Air Force is introducing this new service to alleviate the spectrum saturation of X-band, and it should greatly increase both the available single-user data rate and total satellite capacity over today's Defense Satellite Communications System (DSCS) III satellites.

The WGS consists of two segments. The Air Force is acquiring the satellite segment under the Federal Acquisition Regulation Part 12 rules for commercial item acquisition. First launch is projected for 2QFY06 with the second and third launches following at approximately six-month intervals. The Army is acquiring the ground control segment, and the Military Satellite Communications Joint Program Office is integrating the WGS and GBS space and ground segments. The 2001 Defense Appropriations Act signed on August 9, 2000, limited funding to two satellites. Subsequently, the Office of the Secretary of Defense (OSD) issued a Program Decision Memorandum on August 22, 2000, supplementing WGS funding by $272.9M to ensure funding of the complete constellation of three satellites. In December 2003, OSD directed the acquisition of two additional WGS satellites. The System Program Office projects launch of Satellites 4 and 5 in FY09 and FY10, respectively.

The Program Office plan for WGS satellite launch is to integrate them on both Delta and Atlas Evolved Expendable Launch Vehicles. The first launch will be on Delta and the second on Atlas. Boeing added extra solar panels to their original design, which added weight and changed the class of the Evolved Expendable Launch Vehicle. The availability of the launch vehicle and an aggressive integration schedule, less than the normal 24 months, are sources of schedule risk.

TEST AND EVALUATION ACTIVITY



Test and evaluation planning continued in FY04 for the WGS system. The Air Force Operational Test and Evaluation Center completed an early operational assessment of the WGS system in September 2000 to support a combined Milestone II/III review. The Air Force Operational Test and Evaluation Center performed an operational assessment based primarily on the Critical Design Review data package and briefed DOT&E in May 2003. Government developmental and operational test members started observing contractor developmental testing and inter-segment testing in FY03. Following the Federal Acquisition Regulation Part 12 commercial model, government testing has been limited to "insight" of the contractor test process. To date, DOT&E has received very limited feedback from that insight process.

TEST AND EVALUATION ASSESSMENT

The 2000 WGS early operational assessment highlighted risk areas posed by complexity of X-band and Ka-band satellite cross-banding; and interoperability and compatibility requirements during the concurrent development of the Gapfiller Satellite Configuration Control Element; and the automation upgrades of the Satellite Operations Center and DSCS Operations Center (DSCSOC) networks.

WGS and GBS must also be interoperable and compatible. GBS will structure broadcasts and control the payloads on the ultra-high frequency follow-on satellites. Modified DSCSOCs will control WGS payloads (at X-band and Ka-band), currently only capable of controlling X-band payloads. Interoperability between these two systems must be synergistic and not compete to ensure high speed access for broadcast users.

The test results and analysis presented at the Critical Design Review indicate the design is progressing with no major problems. In addition to the risk areas identified during the early operational assessment, the Critical Design Review identified frequency reuse, satellite orbital placement, and launch service availability as additional risk areas.

WGS should provide added capacity using the same bandwidths presently allocated to DSCS and GBS. The added capacity comes through same-frequency reuse over geographically separated beams. This requires a more detailed Concept of Operations to ensure that beam allocations for concentrated troop positions do not cause overlap of beams on the same frequency. It also requires that the WGS and the DSCS satellite be separated sufficiently in their orbits so that the less capable X-band antenna can discriminate between the two satellites.

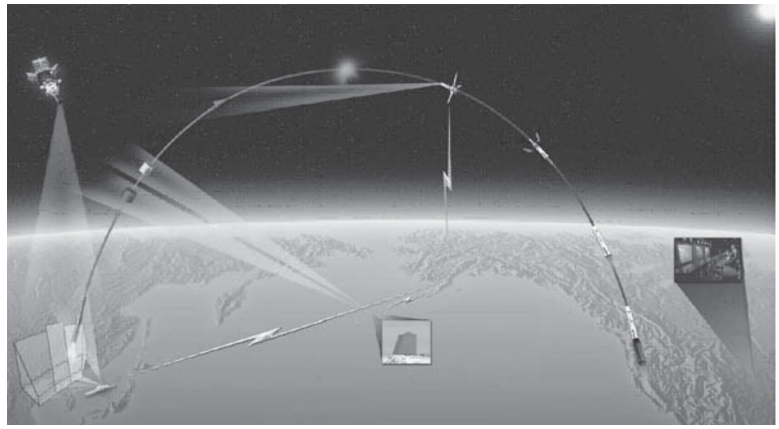
Ballistic Missile Defense System

Ballistic Missile Defense System

Ballistic Missile Defense System (BMDS)

INTRODUCTION

This report provides an unclassified assessment of the Ballistic Missile Defense System (BMDS) test program during FY04. Classified discussions will be included in the Annual Operational Test & Evaluation Assessment of the Ballistic Missile Defense System Test Program that DOT&E will submit in February 2005.



Numerous ground tests and exercises have demonstrated system interconnectivity and limited interoperability.

The Missile Defense Agency (MDA) continues to develop a missile defense capability to defend the United States, our deployed troops, friends, and allies from ballistic missile threats of all ranges and in all phases of flight. During FY04, MDA focused on system integration testing. Numerous ground tests and exercises have demonstrated system interconnectivity and limited interoperability. However, the components of the BMDS remain immature. It is not possible to estimate the current mission capability of the BMDS with high confidence. Any such assessment of mission capability and military utility will rely heavily on models and simulations of individual elements and the integrated BMDS. The lack of flight-testing has delayed the validation and accreditation of some key performance models and simulations. Nevertheless, MDA has made significant progress in the construction and equipping of the BMDS test bed. Ground testing has improved our confidence that military operators could exploit any inherent capability that may exist in the test bed, if needed in an emergency. Our assessment of the major BMDS elements follows.

MDA, DOT&E, and the Service Operational Test Agencies are finalizing an Integrated Master Test Plan that details the combined developmental and operational testing planned in 2005. MDA and DOT&E will approve the plan in November 2004.

Aegis Ballistic Missile Defense (Aegis BMD)

SUMMARY

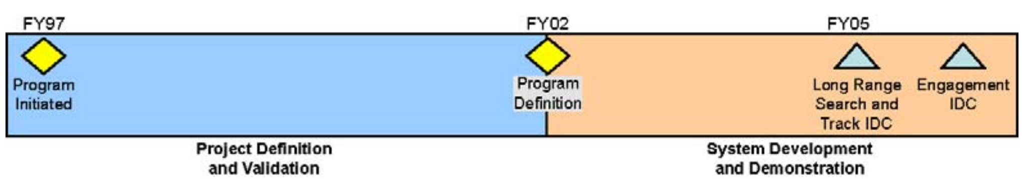
- The Aegis BMD system has demonstrated that it can intercept a unitary, short-range target in the ascent and descent midcourse phases of flight.
- The kinetic kill vehicle has demonstrated that it can divert to an impact point on the payload section of the target.
- Improper functioning of the kinetic kill vehicle Divert and Attitude Control System, when using the pulsed thrust modes, occurred during Flight Mission 5 in June 2003. Flight-testing planned in 2005 should validate design changes intended to resolve this issue.
- The program demonstrated Long-Range Search and Track capability in GMD flight-tests and in Glory Trip 185.
- The BMDS has not used Aegis track data in real time to support an intercept of a long-range ballistic missile.
- All Aegis BMD flight-testing employs operational Navy ships with operational crews.

Given a command, the Aegis ship launches the three-stage SM-3 hit-to-kill missile and kinetic warhead.

SYSTEM DESCRIPTION AND MISSION

The Aegis BMD element design provides the ability to defeat short-range (less than 600 kilometers), medium-range (600 to 1,300 kilometers), and intermediate-range (1,300-5,500 kilometers) ballistic missiles outside the atmosphere. The Aegis BMD element consists of the shipboard Aegis Weapon System and the Standard Missile-3 (SM-3) missile. Aegis BMD includes a Long Range Surveillance and Track capability (Aegis BMD 3.0E software) to support BMDS engagements of intercontinental ballistic missile threats. The Aegis Weapon System detects and tracks the threat, and provides guidance information to the SM-3 missile. Given a command, the Aegis ship launches the three-stage SM-3 hit-to-kill missile and kinetic warhead.

TEST AND EVALUATION ACTIVITY



Aegis BMD conducted Flight Mission-6 (FM-6) at the Pacific Missile Range Facility on December 11, 2003. FM-6 was the first Aegis BMD mission to guide a kill vehicle to intercept the target at the lethal aim point on the warhead section. Aegis also provided real time kill assessment. A “no notice” target launch and the use of intelligence messages developed by the Navy’s Operational Test Agency enhanced the test’s operational realism.

MDA conducted multiple tests during FY04 to demonstrate the Aegis BMD element’s ability to transmit data to other BMDS elements. These included Pacific Explorer II in March, targets of opportunity including Glory Trip 185 in June, Pacific Explorer III in July, and Pacific Explorer IV (in conjunction with SICO-6A) in September. This is also a test objective for GMD IFT-13C.

In October 2004, Integrated Ground Test 4 tested the BMDS Limited Defensive Operations capability to detect and track a threat ballistic missile and transition the track between BMDS elements using Aegis BMD 3.0E software. This testing included off-nominal and variation cases.

In FY05, MDA plans three intercept tests against unitary and separating targets using Aegis BMD 3.0 and the SM-3 Block I missile. Aegis BMD plans to participate in GMD flight-tests to demonstrate Long Range Surveillance and Track performance. MDA plans to make SM-3 Block I missiles available to the combatant commander for emergency use, if required, beginning early in 2005.

TEST AND EVALUATION ASSESSMENT

The Navy deployed the Long Range Surveillance and Track capability on Aegis destroyers in 2004 and exercised the software during Pacific Explorer IV/SICO-6a events. Aegis BMD 3.0E software includes the capability to launch Tomahawk missiles, as well as ship self-defense. The current schedule plans for SM-3 Block I missiles to be available in December 2004 and tested in FY05. Plans are for Aegis BMD ships to demonstrate a limited anti-air warfare self-defense capability and a missile defense capability with SM-3 Block IA missiles in January 2006. Confirming search and track performance to support BMDS engagements of intermediate and long-range ballistic missiles is a high priority objective for future tests.

Performance problems with the kinetic warhead Divert and Attitude Control System, noted during Flight Mission 5, remain a concern. Plans are to flight-test the updated design for the Divert and Attitude Control System in FY05. Separating target tests scheduled for the second and third quarter of 2005 will confirm divert capability.

GMD has not yet used actual long-range missile track data from Aegis BMD to develop a Weapons Task Plan in real time. GMD has demonstrated this capability during ground tests using previously recorded data transmitted from Aegis BMD. MDA plans to use the Long Range Surveillance and Track data to develop a Weapons Task Plan in real time during IFT-14 - Engage on Aegis - in 3QFY05, and Flight Test Ground-Based Interceptor 04-1 - Engage on Beale - in 4QFY05.

Airborne Laser (ABL)

SUMMARY

- The program demonstrated Beam Control/ Fire Control functionality in the laboratory.
- Subsystem integration and test aircraft assembly continue.
- ABL has no operational capability since it is currently in the design/development phase.

ABL is a modified Boeing 747-400F commercial aircraft with the military designation YAL-1A.

SYSTEM DESCRIPTION AND MISSION

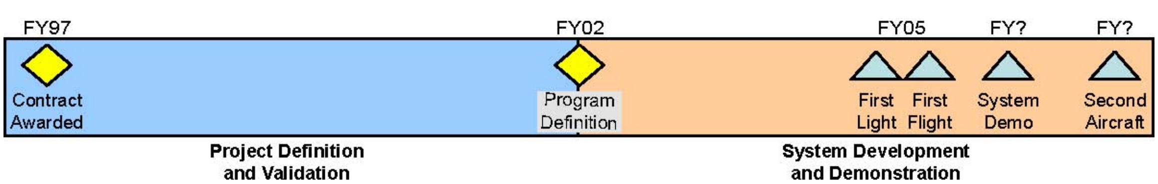
The Airborne Lasesr (ABL) element mission is to negate enemy ballistic missiles during their boost phase. The ABL engagement concept involves placing sufficient laser energy on the missile booster motor tank in order to weaken the casing. This weakening allows internal pressure to rupture the booster motor tank and destroy the missile. A successful engagement in the boost phase kills the threat missile before it deploys its decoys, warheads, or submunitions.

ABL is a modified Boeing 747-400F commercial aircraft with the military designation YAL-1A. Major weapon components include:

- A Megawatt chemical oxygen-iodine high-energy laser.
- The Beam Control/Fire Control: Nose-mounted turret and optical benches containing highly sensitive cameras, sensors, deformable and steering mirrors, and a set of Illuminator Lasers (Beacon and Tracking) that enable the system to track the target.
- The Battle Management, Command, Control, Communications, Computers, and Intelligence hardware and software.
- The ground support equipment for chemical storage, mixing, and handling; transport carts for loading/unloading chemicals at the aircraft.

MDA restructured the program during the year to focus on achieving specific technical goals each year. The 2004 goals include first light of the High Energy Laser in the System Integration Laboratory at Edwards Air Force Base, California; integration of the Beam Control/Fire Control on the aircraft; and passive (no lasing) flight-tests to evaluate the integration and performance of the Beam Control/Fire Control and the Battle Management, Command, Control, Communications, Computers, and Intelligence subsystem.

TEST AND EVALUATION ACTIVITY



ABL demonstrated Beam Control/Fire Control functionality in the laboratory at Sunnyvale, California. The Beacon and Tracking Illuminator Lasers have since experienced power losses. The root cause of reduced power output over time from each laser has been determined, and a plan is in place to correct the performance of the illuminator lasers. Boeing is

integrating the Beam Control/Fire Control onto the aircraft, and will be testing it in passive (no lasing) flight-tests, without the Beacon and Tracking Illuminator Lasers. Component integration and testing will continue over the next several years.

TEST AND EVALUATION ASSESSMENT

ABL successfully demonstrated Beam Control/Fire Control functionality in the laboratory. The subsequent issues with the Beacon and Tracking Illuminator Lasers are typical of this highly complex, state-of-the-art developmental program. The deliberate approach that progresses testing from the developer's laboratory Beam Control/Fire Control testing to the system integration laboratory and, finally, to the aircraft, is prudent. The program's focus on specific and increasingly difficult technical goals each year systemically reduces program technical risk.

Arrow Weapon System (AWS)

In the first flight-test, the AWS successfully intercepted a unitary liquid-fueled ballistic missile.

SUMMARY

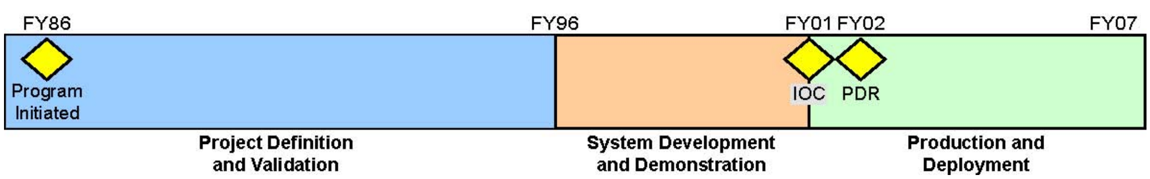
- The Arrow Weapon System (AWS) conducted two flight-tests in the United States:
  - Flight-test-1 successfully intercepted a short-range liquid fueled target.
  - Flight-test-2 failed to intercept a longer-range target due to a failed component in the kill vehicle's propulsion system.

SYSTEM DESCRIPTION AND MISSION

Israel's AWS provides missile defense against short- and medium-range ballistic missiles. It consists of the Arrow II interceptor and launcher, the Green Pine fire control radar, the Citron Tree battle management center, and the Hazelnut Tree launch control center.

TEST AND EVALUATION ACTIVITY

Due to the smaller test ranges in Israel that limited all previous system testing, the AWS conducted two flight-tests in FY04 at the Point Mugu Naval Air Warfare Station in California. The larger Point Mugu test range can accommodate longer-range ballistic missile targets that are representative of the threat. These two flight-tests assessed AWS performance against longer-range targets than those tested previously. The first Point Mugu flight-test occurred July 29, 2004. The second flight occurred August 26, 2004.



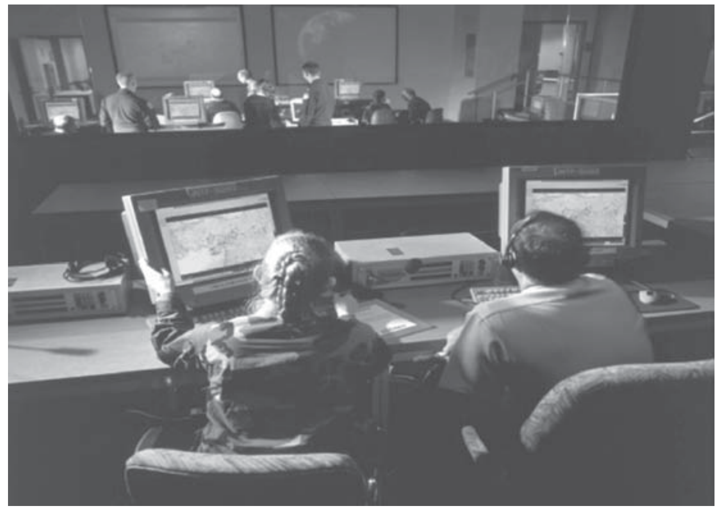
TEST AND EVALUATION ASSESSMENT

In the first flight-test, the Arrow Weapon System successfully intercepted a unitary liquid-fueled ballistic missile. The second flight-test was against a more stressing, longer-range target with a separating reentry vehicle. The Arrow interceptor failed to hit the second target because of a malfunction in the kill vehicle's sustainer motor. The malfunction resulted in the loss of the kill vehicle's maneuver control. As a result, the kill vehicle's guidance sensor never entered the endgame to acquire the target. The program is currently investigating the cause of the malfunction.

Command, Control, Battle Management, and Communications (C2BMC)

SUMMARY

- Command, Control, Battle Management, and Communications (C2BMC) provides situational awareness for the Limited Defensive Operations system.
- MDA will use GMD Fire Control to conduct battle management functions during FY05 (Block 04).
- Consistency between the C2BMC and other sources of information available to the warfighter remains a high priority test issue.



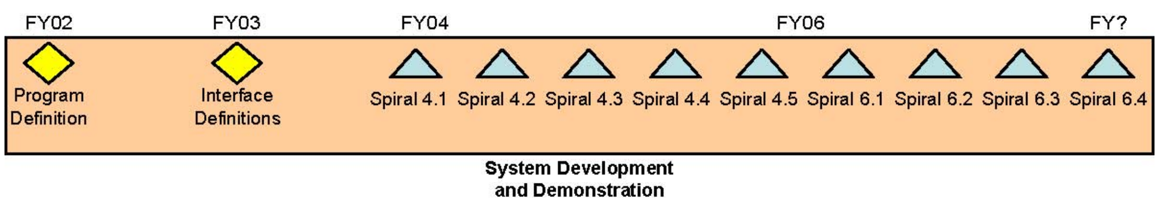
C2BMC will participate in many events throughout Block 2004 testing.

SYSTEM DESCRIPTION AND MISSION

The C2BMC element will be the battle manager for the objective BMDS. Current C2BMC element capability is limited to providing situation awareness information to the U.S. Strategic Command and U.S. Northern Command.

Future capabilities potentially include providing a common operational picture, voice authorization for weapons release, track correlation and fusion for multiple BMDS sensors, and an integrated BMDS communications network.

TEST AND EVALUATION ACTIVITY



Missile Defense Integration Exercise 04a (MDIE-04a) occurred in February-March 2004. MDA completed MDIE-04b in October 2004.

C2BMC will participate in many events throughout Block 2004 testing.

TEST AND EVALUATION ASSESSMENT

MDIE-04a demonstrated the ability to receive information and provide limited situational awareness. MDIE-04b demonstrated the ability to receive information and provide improved situational awareness.

Ground-Based Midcourse Defense (GMD)

SUMMARY

- Ground-Based Midcourse Defense (GMD) assets required for limited defensive operations are in place.
- Limited end-to-end system-level test data precludes characterizing GMD capabilities with confidence.
- Test data indicate that some limited defensive capability likely exists.
- System development and integration issues indicate that the system is still maturing.
- Continued progress developing the Test Bed will increase flexibility for future testing options.

GMD contains a fire control system, sensors, and Ground-Based Interceptors.

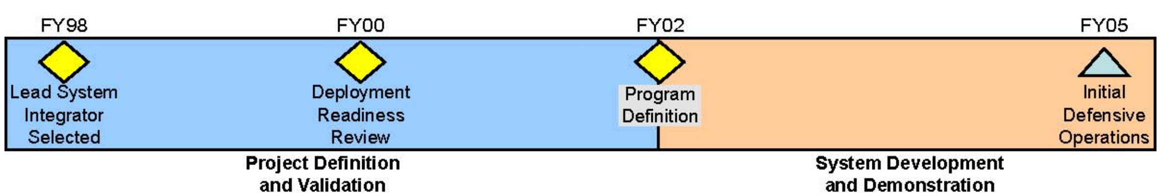
SYSTEM DESCRIPTION AND MISSION

The GMD mission is to negate long-range ballistic missiles in midcourse of their trajectory. GMD accomplishes this by launching a maneuvering kill vehicle that intercepts the threat warhead outside the atmosphere. GMD contains a fire control system, sensors, and Ground-Based Interceptors. The GMD Fire Control and Communications network links the element components via fiber optic links and satellite communications. There are two GMD Fire Control and Communications control nodes: one at Fort Greely, Alaska, and one at Colorado Springs, Colorado. MDA uses an additional control node at the Reagan Test Site to support flight-testing. The Reagan node is not currently part of the operational configuration.

Several long-range sensors provide target detection and tracking. The Cobra Dane early warning radar at Shemya, Alaska, and the upgraded early warning radar at Beale Air Force Base, California, are both part of the initial GMD system. In December 2005, the program plans to deploy a sea-based X-band radar. The sea-based radar will add flexibility and capability for conducting more complex testing. It should also significantly increase BMDS capability to engage potential threats when deployed as an operational sensor. The ground-based radar prototype at Kwajalein Atoll is a risk reduction effort for the sea-based X-band radar and currently supports test events.

MDA is installing Ground-Based Interceptors at two missile fields for the initial configuration of the BMDS. MDA installed six Ground-Based Interceptors at Fort Greely between July and November 2004. Two Ground-Based Interceptors should be emplaced at Vandenberg Air Force Base, California, by the end of December 2004. These early Ground-Based Interceptors use Orbital Sciences Corporation boosters and Raytheon exoatmospheric kill vehicles.

TEST AND EVALUATION ACTIVITY



MDA focused on system-level test events in FY04 to provide data for characterizing the Limited Defensive Operations capability. The test events included System Integration and Checkout (SICO) exercises, Integrated Ground Tests (IGT), Pacific Explorer exercises, and targets of opportunity. The primary purpose of SICO exercises was to confirm that the

elements of the BMDS could function as an integrated system. IGT-2 and IGT-4a/b were higher fidelity hardware-in-the-loop tests designed to characterize performance of the GMD system in several engagement sequences. Military operators have participated throughout these tests to confirm human-in-control functions. At the conclusion of SICO-6a, warfighters executed Missile Defense Integration Exercise (MDIE-4b) using operational procedures on mission equipment.

MDA conducted two non-intercept flight-tests in FY04, each using a different booster design. The Boost Vehicle-5 test event on January 9, 2004, was a successful test of the Lockheed Martin prototype boost vehicle. On January 24, 2004, Integrated Flight-test (IFT)-13B successfully tested the Orbital boost vehicle that will be used for Limited Defensive Operations. IFT-13B was a system-level mission that included participation from the Command, Control, Battle Management, and Communications (C2BMC), Aegis, and warfighters participating at key positions issuing engagement commands.

IFT-13C is the next planned flight-test and will exercise the Limited Defensive Operations system. While an intercept is not a test objective, a successful intercept could occur. MDA will launch the target from Kodiak, Alaska, and the Ground Based Interceptor from Kwajalein Atoll in the Marshall Islands. IFT-13C will be first system-level flight-test to use the Kodiak, Alaska, facility to launch a target missile. IFT-13C will also be the first flight-test using the Limited Defensive Operations-configured Ground-Based Interceptor hardware and software. This flight-test will provide new engagement geometry against a dynamic target. MDA has rescheduled IFT-13C several times due to manufacturing and design problems discovered during ground testing. Before announcing the reschedules, MDA provided DOT&E details on the rationale for each reschedule. DOT&E concurred with each reschedule.

TEST AND EVALUATION ASSESSMENT

System-level test events have demonstrated basic BMDS functionality. Military operator personnel participated effectively, and demonstrated proficiency with the system. Delays in the flight-test program have put some of the ground test results at risk, since simulations used in ground testing require flight-test data for validation. MDA has not yet confirmed hardware and software changes in the Limited Defensive Operations interceptors through flight-testing. Limited availability of end-to-end system-level test data precludes characterizing GMD capabilities with confidence.

Test capabilities and range safety issues continue to limit test realism. The location and orientation of legacy radars relative to the flight-test range require GMD to use other means to provide midcourse tracking data. IFT-13C will be the first flight-test to include data from a realistic midcourse sensor. While still not an end-to-end test of the Cobra Dane radar, IFT-13C will use Global Positioning System data from the target to stimulate a Cobra Dane radar simulator to provide midcourse tracking data to the GMD fire control system. MDA will conduct the first flight-test that exercises end-to-end midcourse sensor performance in FY05, using the upgraded Beale early warning radar to track a target out of the Kodiak launch facility. This new Kodiak target launch capability, and the addition of the Sea-Based X-band radar in FY05, will increase the Test Bed capability and allow more engagement geometries to be tested.

The GMD program has demonstrated the technical feasibility of hit-to-kill intercepts against reentry vehicles in limited target complexes. The Test Bed architecture is now in place and should have some limited capability to defend against a threat missile from North Korea. Kill vehicle performance against threat representative targets remains a high priority test objective for future testing. Testing delays reflect the significant challenges of integrating a complex, globally distributed system with prototype components.

Kinetic Energy Interceptor (KEI)

SUMMARY

- Kinetic Energy Interceptor (KEI) is an early developmental boost/ascent phase kinetic energy hit-to-kill element with potential midcourse capability.
- MDA recently completed a programmatic restructuring of KEI.

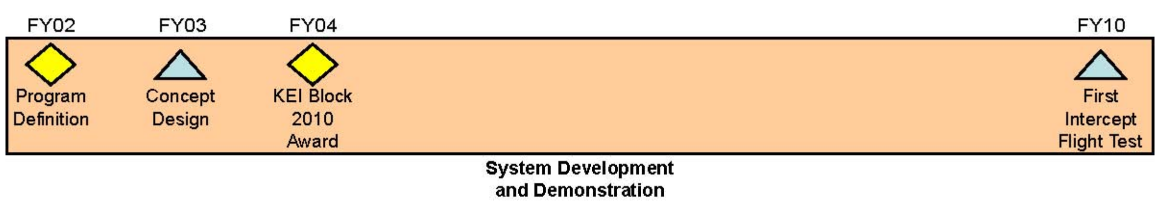
SYSTEM DESCRIPTION AND MISSION

The KEI effort is developing a hit-to-kill element that can be land or sea-based to destroy intermediate range and intercontinental ballistic missile threats in their boost/ascent phase. If feasible, the program may modify KEI to provide intercept capability in the midcourse phase of flight. The KEI element will consist of three components: high velocity interceptors, a launcher, and a command and control system for fire control. KEI will have no organic sensor for target detection and tracking; it will rely on targeting information provided directly from overhead sensors or through the external, BMDS Command, Control, Battle Management, and Communications network. The restructured program schedules development of a land-based KEI capability in Block 2012 and a sea-based KEI in Block 2014.

Boost phase defense relies on extremely rapid detection and tracking of threat missiles. In FY06-07, the program is planning the Near-Field Infrared Experiment, a satellite-based data collection activity to acquire target signatures to support the KEI development test and evaluation program.

The restructured program schedules development of a land-based KEI capability in Block 2012 and a sea-based KEI in Block 2014.

TEST AND EVALUATION ACTIVITY



In December 2003, after a competitive concept design phase, MDA awarded a KEI development contract through January 2012 to a Northrop Grumman-led team. The flight-test schedule begins with booster testing in FY08 and FY09, followed by seven intercept tests between FY10 and FY12. Four of the KEI interceptor launches will be from San Nicholas Island, part of the Point Mugu, California, test complex. The other three tests will fire KEI interceptors from a container ship located off the California coast. Use of the ship will permit the KEI to achieve the desired engagement geometries. In these tests, the container ship is merely a mobile launch platform, and is not the eventual sea-based KEI platform. The program will launch all targets used in KEI intercept tests from Vandenberg Air Force Base, California.

TEST AND EVALUATION ASSESSMENT

Since the KEI element is early in development and in the midst of program restructuring, MDA has not fully defined the test and evaluation plans. However, MDA has begun developing a Live Fire Test and Evaluation strategy for KEI. The KEI element is also participating in MDA's Test Envelope Expansion Working Group, which is developing policies to enable realistic missile defense tests while limiting the risk to space assets from intercept debris.

Space Tracking and Surveillance System (STSS)

SUMMARY

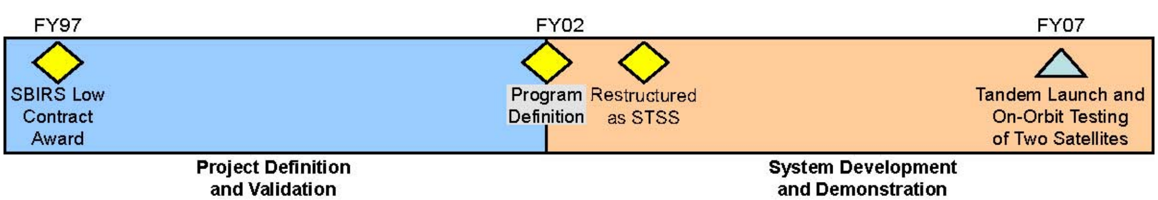
- The Space Tracking and Surveillance System (STSS) program is concentrating on assembly, integration, and test of the first two demonstration satellites, scheduled to launch in FY07.
- Additional activities have focused on the STSS Surrogate Test Bed integration with the BMDS Command, Control, Battle Management, and Communications.
- STSS has no operational capability since it is currently in the design/development phase.

The STSS is the space-based sensor element of the BMDS.

SYSTEM DESCRIPTION AND MISSION

The STSS is the space-based sensor element of the BMDS. It will be a low-earth-orbit satellite constellation with cross-link capabilities. Its mission is to acquire, track, assess, and report ballistic missile and target complex objects from launch lift-off through intercept.

TEST AND EVALUATION ACTIVITY



Block 2004 STSS test activities consist of ground tests, simulations, and dry runs using the STSS Surrogate Test Bed. The program is evaluating communications protocols and procedures to assess the ability to disseminate STSS data through BMDS Command, Control, Battle Management, and Communications to other BMDS elements. System and software integration tests began in FY04. The STSS Surrogate Test Bed participated in the Critical Measurements Program 4 flight-test in FY04, and plans to participate in Integrated Flight-test 13C. Test objectives are to demonstrate data flow and target information to the to BMDS Command, Control, Battle Management, and Communications element.

The STSS Surrogate Test Bed will continue to participate in BMDS flight-tests throughout FY05. MDA has a STSS Development Master Test Plan, with an updated version due at the end of the year. Testing of the full capabilities of the STSS will occur in Blocks 2006 and 2008.

TEST AND EVALUATION ASSESSMENT

The STSS Block 2006 Critical Design Review in FY04 was successful. It is currently in development for a Block 2006 launch. The earliest operational capability will be after the launch of the first two satellites. The early STSS capability will have major onboard power constraints and coverage limitations.

Terminal High Altitude Area Defense (THAAD)

SUMMARY

- The Terminal High Altitude Area Defense (THAAD) element radar and Command, Control, Battle Management, and Communications (C2BMC) Test Bed hardware are deployable in contingency operations.
- MDA plans to deliver hardware for a single THAAD fire unit in FY09.
- MDA and the Army are developing a plan to transition the first fire unit to the Army.
- There are currently no plans for dedicated operational testing of the THAAD element.
- The flight-test program delays are due to programmatic issues and frequent budget reprogramming actions. Also contributing to the delay was a factory explosion in 2003 that forced the program to seek and qualify a second source for rocket motor manufacturing.

THAAD is a mobile ground-based element of the terminal defense segment of the BMDS.

SYSTEM DESCRIPTION AND MISSION

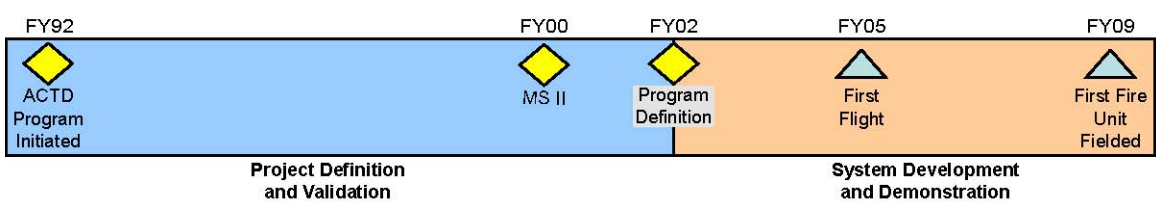
THAAD is a mobile ground-based element of the terminal defense segment of the BMDS. It will protect forward-deployed military forces, allies, and population centers from short-, medium-, and intermediate-range ballistic missile attacks. The system consists of four segments:

- Missile
- Launcher
- Radar
- Battle Management/Command, Control, Communications and Intelligence

The THAAD missile uses a kinetic energy kill vehicle to intercept incoming ballistic missile warheads in the late midcourse or terminal phases of their trajectories - either outside the atmosphere (exoatmospheric intercepts) or very high in the atmosphere (endoatmospheric intercepts).

The THAAD element continues to mature. The program completed the Element Critical Design Review in December 2003. White Sands Missile Range received THAAD radar in March 2004, where it is tracking targets of opportunity. The Missile Production Facility in Troy, Alabama, activated in May 2004, has started producing and testing the pathfinder missile. MDA conducted an initial readiness review for Flight-test – 1 (FT-1) in June 2004.

TEST AND EVALUATION ACTIVITY



The THAAD program accomplished extensive component level testing in FY04. Missile assembly testing progressed well. The THAAD launcher demonstrated the ability to roll-on/roll-off a C-17. MDA performed a Short Hot Launch test

using missile rounds that contain only a fraction of the normal missile propellant. This test evaluated the new missile egress out of a new canister and launch environments. The test also provided data to address range safety issues associated with firing a missile round. The Short Hot Launch test also provided data on the adequacy of the missile design, and increased confidence in the success of first flight-test, FT-1.

FT-1 is on schedule to launch in 3QFY05 at White Sands Missile Range. FT-1 will measure THAAD missile dynamic performance in a high endoatmospheric environment. FT-2, scheduled for 4QFY05, will demonstrate integrated THAAD system closed-loop operations and engagement functions against a simulated unitary target. MDA has scheduled two additional THAAD element flight-tests for early FY06 at White Sands Missile Range. The first BMDS flight-test event that THAAD will participate in is Flight Test THAAD 06-1, scheduled for 4QFY06, at the Pacific Missile Range Facility in Hawaii.

No integrated system-level testing occurred in FY04; however, the program conducted assembly level qualification testing in FY04. The program developed numerous ground test missiles to support various engineering and developmental test activities necessary to reduce flight-test risk. Production software development continues on two of the ground test missiles to support production and test at the Troy Production Facility. Integration testing between the missile and Launch and Test Support Equipment continues at the Software Integration Laboratory to surface and correct integration issues before moving to the range to perform these functions. Extensive contractor testing of missile and radar components continues.

TEST AND EVALUATION ASSESSMENT

Several issues have affected the THAAD test program progress:

- Budget reprogramming actions have resulted in test program restructuring and delays.
- The program successfully demonstrated the redesigned missile canister in an October 2004 Short Hot Launch test.
- The program postponed the 56-inch missile drop test from 1QFY05 to 1QFY06 to support the fielding approach. In the interim, the program will move the missile on the transporter, which has already demonstrated aircraft roll-on, roll-off to the Air Force.
- Due to funding issues, delayed development of the prime power unit for the radar requires the use of other generators during testing at White Sands Missile Range. The program is investigating the possibility of using type-classified generators from the Air Force or the Army to field the THAAD Radar.
- The contractor changed the fuel for the Divert and Attitude Control System to improve stability. This change caused the system to fail the original cold temperature specification.

Target development continues at a defined pace. Of the four target types planned for testing, MDA has approved one, has made progress approving another, and has delayed approving the last two until range safety issues at the Pacific Missile Range Facility are resolved. MDA is examining various alternatives to provide flight-test realism.

It is uncertain how THAAD will transition to the Army. As a result, there are no plans at this time for operational testing of the THAAD element or an initial THAAD fire unit. Operational testing is necessary to improve understanding of THAAD performance, military operational capabilities, and to justify procurements beyond the first tactical fire unit.

Live Fire Test & Evaluation

Live Fire Test & Evaluation

Overview

In FY87 Congress passed Title 10, Section 2366, requiring the Department to conduct realistic survivability and lethality testing of major conventional air, land, and sea platforms, as well as munition and missile programs. The Federal Acquisition Streamlining Act of 1994 moved responsibility for LFT&E from the Under Secretary for Acquisition, Technology, and Logistics to DOT&E. LFT&E is an integral part of DOT&E's evaluation of operational effectiveness, suitability, and survivability of major defense acquisition programs. The LFT&E program goal is to provide a timely and reasonable assessment of the survivability and/or lethality of a system with particular attention to preventing or minimizing crew casualties.

INVESTMENT INITIATIVES

The LFT&E office provides technical and fiscal oversight to several programs related to its statutory responsibilities for survivability and lethality test and evaluation. Through these programs, DOT&E funds testing and evaluation of fielded air, land, and sea platforms, the production of joint munitions effectiveness manuals, and advanced technologies and methodologies to increase aircraft survivability.

From its involvement in the acquisition process and through the investment programs, DOT&E focuses on efforts that are of immediate concern to our deployed forces. For example, in FY04 DOT&E learned that helicopter pilots and crews in Operation Enduring Freedom/Operation Iraqi Freedom (OEF/OIF) were unfamiliar with the launch signature of a rocket-propelled grenade. Enemy combatants were using rocket-propelled grenades, traditionally a ground-to-ground weapon, to attack helicopters. Through the Joint Live Fire (JLF) program, DOT&E funded an extensive three-phase test and evaluation program consisting of firing rocket-propelled grenades against helicopters. The Joint Aircraft Survivability Program assembled video footage of rocket-propelled grenades launches to aid training of deployed forces. Feedback from units that received the training aid indicates it is very helpful in preparing pilots and crews to identify this new threat to helicopters.

During FY04, the U.S. inventory of 5.56mm and 7.62mm ball ammunition became low. To allow time for U.S. production to replenish depleted stocks, the Army decided to purchase ammunition from Great Britain using standard NATO agreements. As part of the Army Materiel Release process, DOT&E reviewed technical specifications and ballistic data from Great Britain to ensure that the munitions purchased provided lethality comparable to U.S.-produced ammunition. In both cases, DOT&E concluded that the British and U.S. munitions were comparable.

There has been much controversy about the lethality of the U.S.'s primary 5.56mm bullet, the M855 ball round, against OEF/OIF enemy combatants. The M855 cartridge, designed in the 1960s, demonstrates significant effectiveness against a medium build, lightly armored combatant. Developmental testing demonstrated the M855 cartridge is the best all-purpose bullet for the M16 family of infantry rifles. However, the OEF/OIF combatants are not of medium build and are not armor protected. Moreover, the M16 family of rifles includes the M4 rifles that have a shorter barrel. These factors combine to decrease the lethality of the M855 in current OEF/OIF theater operations. For the near term, U.S. forces try to overcome the decrease in lethality through good marksmanship and shot discipline. For the long term, DoD should consider a new round to increase lethality.

DOT&E is participating with the Army and with the Special Operations Command in investigating the lethality of the M855 compared to other available ammunitions, and also evaluating new technologies in ammunition manufacturing. The Army funded an effort to standardize ballistic wound test and evaluation. The Army effort will generate data on the performance of over 40 cartridges of various calibers and design. These data may lead to the identification of a projectile that is better suited for engaging a thin, lightly clothed combatant.

JOINT LIVE FIRE PROGRAM (JLF)

OSD initiated the JLF program in March of 1984 to establish a formal process to test and evaluate fielded U.S. systems against realistic ballistic threats. The program continues with emphasis on addressing urgent needs of deployed forces and assisting program managers in the acquisition community. JLF can rapidly fund urgent needs of deployed forces and can quickly execute test programs to address data shortfalls (such as rocket propelled grenade effects against helicopters). JLF also addresses the vulnerability of legacy platforms.

The JLF program consists of three groups: Aircraft Systems (JLF/AS), Armor/Anti-Armor (JLF/A/AA), and Sea Systems (JLF/SS). Following are examples of projects funded by JLF.

Aircraft Systems Program

- **AH-1 Testing.** JLF investigated the vulnerability of the AH-1 Cobra front-line attack helicopter to the rocket propelled grenade threat. The goal was to identify potential survivability enhancements for this and other helicopter platforms. This effort was the first empirical vulnerability investigation of helicopters to this threat. It also provided information to aid combat mission planning, aid battle damage assessment repair training, provided vulnerability reduction recommendations, and increased aircraft/aircrew survival and effectiveness in combat. Testing examined rocket propelled grenade fuze sensitivity and effects of a near-miss detonation against light-skinned helicopters. The project will culminate in 1QFY05 with tests against an operational helicopter.

- **CH-47 Testing.** JLF is conducting a joint effort with the Cargo Helicopter Program Manager and commercial armor developers to design, manufacture, and qualify a shield that will reduce fuel fires resulting from small caliber projectile impacts on the CH-47D Chinook engine fuel feed shutoff valve. This effort will provide recommendations for more survivable helicopter fuel feed shutoff valves and will increase the survivability of two fielded Army H-47 models and the future production F model.

- **CH-53 Testing.** In FY04 and continuing into FY05, JLF will conduct vulnerability testing against the CH-53 using several threat munitions: 12.7mm armor piercing incendiary (API), 14.5mm API, 23mm API, and high explosive incendiary munitions. Test personnel will perform post-damage endurance testing on dynamic components to evaluate the reduction or loss of dynamic flight load capability.

- **H-60 Testing.** In FY05, JLF will test dry-bay foam vulnerability reduction alternatives, improved gearbox durability, and engine nacelle fire extinguishing effectiveness against ballistic threats. Results of this project will be applicable to all tri-Service H-60 aircraft and to the future production of the Army's UH-60M model.

- **Predator Unmanned Aerial Vehicle (UAV) Testing.** In FY04, JLF conducted system vulnerability testing of a Predator wing. Shot line selection used a Computation of Vulnerable Areas and Repair Times simulation analysis completed in FY03. That analysis identified vulnerable areas in the current Predator design. Other unmanned aircraft programs can also benefit from the lessons learned from this effort.

- **Large Turbofan Engine Testing.** In FY04, JLF initiated a multi-year effort to investigate the vulnerability of the CF6 large turbofan engine to Man-Portable Air Defense Systems. This effort will assess Man-Portable Air Defense Systems damage affects on engine thrust and on safety-of-flight. Test results from this effort will support large aircraft (i.e., C-5, KC-10, and E-10A) operational risk assessments and vulnerability analyses leading to improved warfighter protection.

Armor/Anti-Armor Program

- **Munitions Lethality.** Lethality testing finished against a classified foreign main battle tank to:
  - Assess the lethality of current and developmental U.S. munitions.
  - Acquire empirical data to calibrate current vulnerability methodologies.
  - Provide data to assist field commanders in training on how to engage and defeat the tested threat target.
  - Update Joint Effectiveness Manuals for munitions effectiveness.

- **Fast Air Target Encounter Penetration (FATEPEN) Model Methodology Improvements.** JLF funded testing to compare the results of firing steel fragments into steel and aluminum plates with FATEPEN penetration model predictions. These tests provided data for larger mass (1500-grain fragments) and higher obliquity (70 degrees) impacts identified as data deficiencies during the recent accreditation of the FATEPEN model.

- **Low-Speed Rod Penetration Testing Weapon.** JLF fired munitions containing penetration rods similar in size and mass to rods deployed by the passive attack weapon against various targets. Data from this test supports refinement of the penetration equations used to model low speed rod impacts.

- **Lithium-Ion Battery Vulnerability Testing.** The Future Combat System (FCS) program, among others, is considering Lithium-Ion batteries as a technology for storing energy in hybrid-electric propulsion systems. JLF funded experiments to identify potential vulnerabilities associated with ballistic impacts into these types of batteries and is investigating applicable vulnerability reduction measures.

- **Blast Overpressure Testing on Graphite Epoxy Panels.** JLF conducted blast testing against graphite epoxy panels to generate data to validate engineering lethality predictions and to generate composite response algorithms for a wide spectrum of vehicle types. Program managers can now use these composite materials in the FCS, helicopter system upgrades, and UAVs.

Sea Systems Program

The FY04 Sea Systems Program investigated fire and explosive phenomena resulting from ignition of hydraulic oil mist in submarines. The tests showed the results would usually be catastrophic, once ignited. Mitigation methods using current submarine fire fighting equipment were unsuccessful. Although this type of casualty has not occurred on U.S. submarines in peacetime since World War II, there is some likelihood of occurrence in a combat situation.

The JLF Sea Systems Program also initiated an effort to improve the validation of modeling and simulation technologies for the prediction of a Full Ship Shock Trial. JLF Sea Systems will assess the validation for potential application to the DD(X) and Littoral Combat Ship acquisition programs.

JOINT TECHNICAL COORDINATING GROUP FOR MUNITIONS EFFECTIVENESS (JTCG/ME)

About 40 years ago, the Joint Logistics Commanders chartered the JTCG/ME to serve as the DoD focal point for authenticating munitions effectiveness information on all major U.S. conventional (non-nuclear) weapons. The JTCG/ME disseminates this information via Joint Munitions Effectiveness Manuals (JMEMs). U.S. Armed Forces, NATO, and other allies use JMEMs to plan operational missions, for training and tactics development, and to support force-level analyses. Mission planners extensively used JMEMs in planning and executing combat missions in OEF/OIF. The ability to select the "best" weapon to engage a specific target enhances both weapon effectiveness and the ability to minimize collateral damage. In FY04, the JTCG/ME:

- Enhanced the operational tools and data for the Air-to-Surface Weaponeering System, Joint Anti-Air Combat Effectiveness - Air Superiority, and Surface-to-Surface Weaponeering Effectiveness System JMEMs.
- Generated and distributed weapons effectiveness and target vulnerability data for 60 new or updated targets prioritized by the Combatant Commanders.
- Continued expanding existing databases to incorporate newly fielded weapons.

- Continued the development of standardized operational tools and methodology for Air-to-Surface, Surface-to-Surface, and Anti-air effectiveness calculations.
- Conducted Configuration Management/Verification, Validation, and Accreditation efforts on specific JTCG/ME models.
- Coordinated with Joint Chiefs of Staff to develop instructions to codify the Combatant Command requirements data call process and prioritization to support the FY05 JTCG/ME program.

JOINT AIRCRAFT SURVIVABILITY PROGRAM (JASP)

The Joint Aeronautical Commanders Group established JASP by Charter in January 2003 through the integration of the JTCG on Aircraft Survivability, the Joint Live Fire Aircraft Systems program, the Joint Combat Assessment Team, and the Joint Accreditation Support Activity. The program focuses on establishing aircraft survivability as a design discipline and furthering aircraft survivability research, development, test, and evaluation. The JASP:

- Develops vulnerability and susceptibility reduction technologies.
- Provides standard accredited models to assess aircraft survivability.
- Supports combat survivability education.
- Collects combat damage data for analysis.
- Conducts Joint Live Fire tests on combat aircraft.

In FY04, JASP worked with the defense acquisition community, the Department of Homeland Security, the Federal Aviation Administration, the Transportation Security Administration, and the National Aeronautics and Space Administration, to identify critical issues regarding aircraft survivability. Accordingly, JASP funded approximately $8.3M for 60 survivability projects.

- **Vulnerability Reduction:**
  - The Rocket Propelled Grenade Launch and Detonation Video project provided standard, Night Vision Goggles and Forward Looking Infrared video footage showing the signatures of rocket propelled grenades to forces deployed in Iraq, continental U.S. training centers, and the Joint Combat Assessment Team for threat identification training and assessment. The JASP completed this effort in June 2004 in response to a request from the Commander of Marine Aircraft Group 16 to support Marine Aviation units.
  - The Intumescent Instant Firewall project will optimize and demonstrate technologies that form low-cost and lightweight instant firewalls for the control, containment, and management of fire in aircraft compartments.
  - The Air Vehicle Armor Enhancement project will provide enhanced armor package options for the CH-53 and AH-1 helicopter programs.

- **Survivability Assessment:**
  - Developed new vulnerability assessment tools that are modular, physics-based packages the Services can incorporate into their latest vulnerability architectures.
  - Coordination continued with the JTCG/ME and the Services on a set of standard penetration equations for fragments that will be credible over a wide range of impact conditions.
  - The Integrated Survivability Assessment project improved the capability to use operational test data, Live Fire Test data, and modeling and simulation, to develop a more comprehensive survivability assessment of a system.

- **Susceptibility Reduction:**
  - The Common Service Exciter project continued development of a jammer exciter that has 800 MHz of instantaneous bandwidth to jam threat radars effectively. The Common Service Exciter has agilities to support Navy and Air Force needs relating to stand-in jamming and self-protection of UAVs.
  - The Reactive Infrared Suppressor project developed a capability that provides significantly greater signature reductions than current systems.
  - The Affordable Visible Missile Warning System project researched technologies to detect the launch of portable shoulder-fired missiles and to reduce the cost by an order of magnitude over current infrared and ultraviolet sensor systems.

The Joint Combat Assessment Team (JCAT) deployed to OIF in FY04 in direct support of the 3rd Marine Aircraft Wing. Their primary task was to capture perishable data on U.S. fixed- and rotary-wing aircraft, and to ascertain what threats caused the damage. The JCAT accomplished this by inspecting aircraft, acquiring available documentation, and interviewing aircrew and intelligence, weapons and tactics, and logistics personnel. This effort provided valuable information to commanders in OIF, allowing them to make changes to their tactics, techniques, and procedures based on the actual threats encountered. The photographs below show ballistic damage to a Cobra helicopter.

LFT&E investment initiatives, along with Service LFT&E programs, have helped to increase the survivability of our warfighters.

Joint Test & Evaluation

Joint Test & Evaluation

Overview

For over thirty years, the JT&E Program has provided quantitative information for analysis of joint military capabilities and delivered products that directly increased military effectiveness. The program is complementary to, but not a part of, the weapons acquisition process. A JT&E test brings together two or more Military Departments or other components to:

- Assess the interoperability of Service systems in joint operations.
- Evaluate improvements in joint technical and operational concepts.
- Evaluate and validate multi-Service testing methodologies.
- Assess performance of interacting systems under realistic joint operational conditions.
- Provide data from joint field tests and exercises to validate models, simulations and test beds.
- Improve joint tactics, techniques, and procedures (TTPs), recommend changes to Concepts of Operations (CONOPS), and provide recommended Doctrine.
- Improve Joint Training Tasks for the COCOMS.

Director, Operational Test and Evaluation (DOT&E) re-engineered the JT&E process in 2003 to provide increased capabilities and responsiveness to the warfighter. The program was restructured to be more agile and to respond more quickly to emergent needs and requirements. The nomination process was streamlined and testing accelerated, with Joint Tests shortened to a maximum of three years as opposed to the previous five- or six-year test duration. Added to the JT&E Program are Quick Reaction Tests (QRTs) that provide testing and reporting of results in twelve months or less for urgent, high-priority, warfighter operational issues. In its first year of inception three QRTs were directed. The **Joint Survivability (JSURV) QRT** developed and delivered convoy survivability procedures to U.S. Central Command (CENTCOM) to help minimize combat casualties. Approximately ninety percent of deployed convoys are using these procedures. JSURV also developed a U.S. Special Operations Command- (SOCOM) specific combat convoy handbook and convoy leader's graphic training aid for Special Operations Forces operating in Iraq and Afghanistan. The JSURV QRT was completed in nine months from inception to final reporting. Over 40,000 handbooks have been published and provided to our warfighters involved in the Global War on Terrorism.

Other on-going QRTs include **Joint Shipboard Weapons and Ordnance (JSWORD)** and **Joint Low Altitude Aircraft Survivability (JLAAS)**. JSWORD will establish, document, and publish a standard joint procedure for tube loading the 2.75-inch Folding Fin Aerial Rocket on U.S. Army (USA) and USSOCOM helicopters with engines running and blades turning while operating on U.S. Navy ships. JLAAS will develop and validate changes to fixed and rotor wing TTPs that enable them to avoid or defeat potential enemy threats to the aircraft from enemy weapon systems such as Man-Portable Air Defense Systems (MANPADS).

As part of the re-engineering process, current tests were accelerated and test durations shortened. **Joint Cruise Missile Defense (JCMD)**; **Joint Command and Control, Intelligence, Surveillance, and Reconnaissance (JC2ISR)**; and **Joint Unmanned Aerial Vehicle (JUAV)** have shortened their closedown process and accelerated delivery of their final reports to the warfighter by six months. In July 2003, OSD chartered **Joint Datalink Information Combat Execution (JDICE)** six months early, with their first test conducted seven months after being chartered.

As part of the re-engineering improvements, the program office stood up a Joint Test Support Cell (JTSC) to provide a "quick start" capability for both Joint Feasibility Studies (JFSs) and QRT efforts. JT&E efforts have historically been undermanned early in the process, hampered by a steep learning curve for new personnel. The JTSC was established to solve this problem and is manned by a core group of JT&E planning and operational subject matter experts.

During FY04, the JT&E Program Office coordinated participation of four JT&Es at the Combined Joint Task Force Exercise 04-2 (CJTFEX 04-2) to capitalize on program synergies, avoid duplication of effort and resources, and ensure the best employment of personnel and materiel. CJTFEX-02 was a first-of-its-kind designated effort to conduct a simultaneous test and training event that provided real-time testing opportunities to the tester and training improvements to the warfighter.

Joint Global Positioning System Combat Effectiveness (JGPSCE) JT&E provided:

- Live GPS Electronic Warfare (EW) play.
- Assessment of the impact of GPS EW on the Joint Force Air Component Commander, and the ability of ISR sensors to detect GPS jamming.

Joint Methodology to Assess C4ISR Architecture (JMACA) JT&E provided (and validated) methods to rapidly identify C4ISR deficiencies and propose appropriate solutions. The test conducted a re-assessment of CJTFEX 04-2 architecture in less than three days, providing:

- Updated end-to-end information paths.
- Assessment of interoperability risk associated with each functional thread and system.

Joint Cruise Missile Defense (JCMD) JT&E:

- Provided a cruise missile emulator.
- Conducted cruise missile defense mission area CONOPS.

Joint Command, Control, Intelligence, Surveillance, and Reconnaissance (JC2ISR) JT&E:

- Provided mission area analysis for time-sensitive targeting (TST).

Based on the positive results of participation in Joint Test and Training events, the JT&E Program Office is providing a direct coordinator for future test events. In addition, the JT&E Program Office has established a liaison position to integrate JT&E Test Products into appropriate U.S. Joint Forces Command (JFCOM) directorates.

During FY04, the JT&E program selected two Joint Feasibility Studies (JFSs) that will be considered for charter in February 2005.

- **Joint Urban Fires and Effects (JUFE)** increases the ability of the Joint Force Commander (JFC) to conduct urban fires (lethal, non lethal, other) and assess effects relative to the desired operational effect. JUFE was extended as a JFS for one year after the Senior Advisory Council determined it was an important subject for test but the JT&E program lacked funding for it to be chartered.
- **Joint Fires Coordination Measures (JFCM)** proposes to test and evaluate new Joint TTPs designed to standardize kill box procedures and enable theater commanders to more fully integrate component fires at the operational and tactical levels.

A JT&E senior advisory committee will convene in February 2005 to recommend which of these proposed tests will be chartered and start testing. Additional information on current and transitioning JT&E test activities and the products they are delivering to the warfighter are described in the following pages.

Joint Battle Damage Assessment (JBDA)

SUMMARY

- JBDA was a five-year Army-led test that completed September 30, 2004. It was located in Suffolk, Virginia.
- Data were collected from multiple venues. Baseline testing was executed during Ulchi Focus Lens (UFL) 02; Contingency testing at Operation ENDURING FREEDOM and Operation IRAQI FREEDOM and Enhancement testing at UFL-03.
- JBDA's final report was released at the end of FY04. Nineteen of JBDA's enhancements have been transitioned into permanent test products for the joint BDA process across Service and component lines.

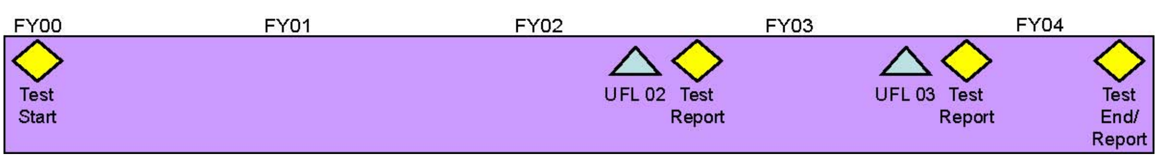
Nineteen of JBDA's enhancements have been transitioned into permanent test products for the joint BDA process across Service and component lines.

TEST DESCRIPTION AND MISSION

JBDA was chartered to study and enhance the joint battle damage assessment (BDA) process. During Operation DESERT STORM, joint force BDA requirements exceeded the available intelligence collection capabilities. The DoD Final Report to Congress, *Conduct of the Persian Gulf War*, stated, "The BDA process was difficult, especially for re-strike decisions." The report recommended the establishment of effective BDA doctrine and organization, and it identified a critical need to develop a BDA process for maneuver forces. A lack of trained BDA analysts exacerbated the situation. The Army was designated as the lead Service and the Army Intelligence Center and School was appointed the sponsoring command. The Joint Chief of Staff/J2T was selected as the operational mentor.

JBDA conducted its testing in operationally-realistic environments during joint exercises and during real world operations using the BDA cycle as the basis for the evaluation to ensure thorough testing of each critical function. JBDA evaluated the processes used by a joint force to assess physical, functional, and target system battle damage, and evaluated the ability of the BDA process to support operational planning and execution.

TEST AND EVALUATION ACTIVITY



JBDA provided input to a GAO report, dated June 2004, (GAO 04-547) dealing with recent military combat operations and barriers to continued progress. JBDA provided the GAO researchers with current information on joint BDA processes and explained how to implement known solutions within combatant commands and other military organizations. These

comments helped shape GAO's perspective on joint BDA and other targeting issues within their report. DoD concurred fully or in part with all four of the GAO's recommendations in its final report.

JBDA dedicated significant effort and resources toward offering, tailoring, and implementing its enhancements in partnership with all applicable combatant commands, Services, and defense agencies. USFK, USCENTCOM, USPACOM, and USEUCOM continue to utilize JBDA enhancements in their quest for improving BDA, combat assessment, and operational/effects-based assessments. *The Commander's Handbook for Battle Damage Assessment*, published by USJFCOM, provides a non-doctrine source for BDA information to the joint community and the Services. USJFCOM's DOTMLPF Change Recommendation Package for BDA, in response to Operation Iraqi Freedom Major Combat Operations Lessons Learned, leaned heavily on JBDA's experience with BDA. In fact, nine of the ten recommended approaches to improving BDA were either developed by or had significant input from JBDA.

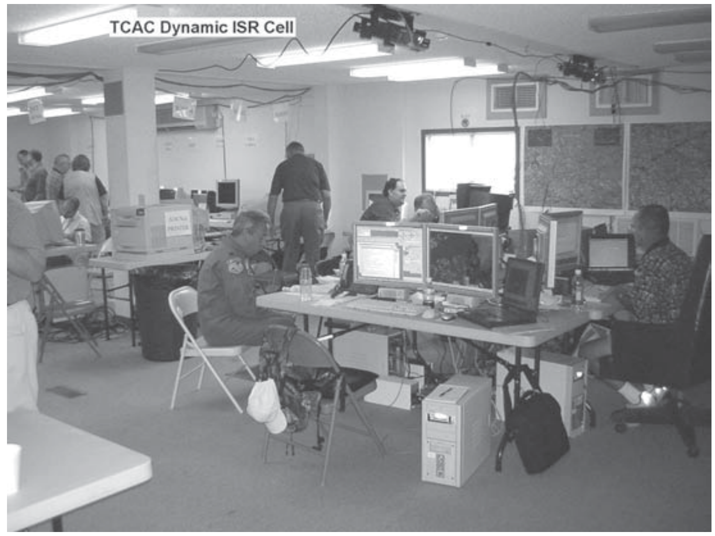
TEST AND EVALUATION ASSESSMENT

JBDA's focus has been on transitioning test validated enhanced procedures for the Joint BDA process, either as stand-alone products, as improvements to existing doctrine, or as part of a system of record. JBDA has transitioned its test products to the end users, to Combatant Commands, JFCOM, and to the Joint Staff. Through the vehicle of a DOTMLPF Change Recommendation at JFCOM, JBDA test products have become a process for change for BDA within the Department of Defense. Joint Staff/J2T has become the office of record for the test products. JBDA was a successful Joint Test that serves the warfighter in the DoD community.

Joint Command and Control, Intelligence, Surveillance, and Reconnaissance (JC2ISR)

SUMMARY

- JC2ISR is a four-and-a-half-year test that is in its final year of execution. It is located at Hurlburt Field, Florida. The Air Force is the lead Service. The final field test was executed in FY04 during CJTFEX 04-2. JC2ISR is completing data analyses and formulating their final recommendations and reports.
- JC2ISR's schedule was shortened by six months to accelerate delivery of final reports to the warfighter and close down early.
- JC2ISR is currently working with USJFCOM to transition capabilities and support exercises after closedown.
- Recommendations resulting from the JC2ISR JT&E significantly improve the Joint Force Commander's (JFC's) ability to integrate assigned organic and higher echelon platforms and sensors in a coordinated (cross-cued) and cooperative (simultaneous) collection strategy.
- Test results provided decision-makers with significantly improved C2ISR tasking, processing, exploitation, and dissemination to support time-sensitive targeting (TST), and are applicable to all joint warfighters.



JC2ISR received accolades for management and development of the Test Control and Analysis Cell at CJTFEX 04-2. This concept has been recommended for inclusion in future exercises.

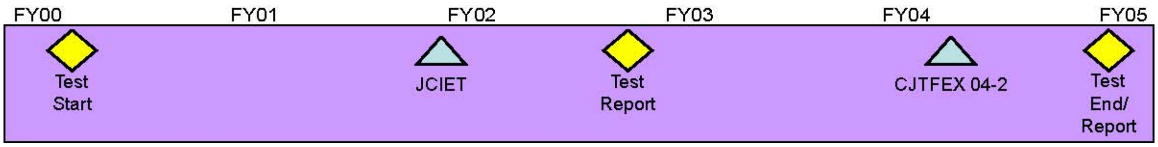
TEST DESCRIPTION AND MISSION

OSD chartered the JC2ISR JT&E in FY00 to employ multi-Service and other DoD Agency support, personnel, and equipment to investigate, evaluate, and recommend improvements to the operational effectiveness of joint C2ISR. Specifically, JC2ISR tested and evaluated Joint Task Force (JTF) and Components' ability to dynamically task and re-task ISR collection platforms and sensors, and their ability to process, exploit, and disseminate combat information to support time-sensitive targeting (TST). JC2ISR baselined the processes used to prosecute time sensitive targets; identified ISR platform and sensor tasking, processing, exploitation, and dissemination deficiencies; and identified opportunities for improvement.

Prior to FY03, JC2ISR conducted two mini-tests and one Field Test and published test reports on each event. During Field Test 1, JC2ISR employed Army, Navy, Air Force, SOF, and allied forces in a littoral environment in conjunction with the Joint Combat Identification Evaluation Team (JCIET) 2002 exercise. Mini-Test 2 and Field Test 1 results were combined with lessons learned from Operation IRAQI FREEDOM (OIF), to define the JC2ISR baseline, recommend improvements, and identify enhancements to improve JC2ISR TPED/Task Process Post Use (TPPU) capabilities against time sensitive targets evaluated during Field Test 2.

JC2ISR deployed several personnel in direct support of OIF; four to the CENTCOM Joint Intelligence Center at MacDill AFB, Florida; one as a member of the Predator unmanned aerial vehicle exploitation team at Beale AFB, California; two to U.S. Army, Central Command, Riyadh, Saudi Arabia; and one to Central Command Air Forces Prince Sultan Air Base, Saudi Arabia.

TEST AND EVALUATION ACTIVITY



In FY04, JC2ISR conducted its final field test, Field Test 2, in conjunction with Combined JTF Exercise (CJTFEX) 04-2. CJTFEX 04-2, the first Joint National Training Capability (JNTC) Thrust Three event, employed Army, Navy, Air Force, Special Operations Forces (SOF), and allied forces in a littoral environment in a joint field training exercise.

At the request of JFCOM, JC2ISR was designated the office of primary responsibility for TST data collection, analysis, and reporting during CJTFEX 04-2. JC2ISR evaluated the TST Joint Tactical Tasks (JTTs) for this major multinational exercise and developed a new Joint TST Universal Joint Task List for use in future exercises. JC2ISR, working in concert with Ninth Air Force (9AF), the exercise Joint Air Operations Center (JAOC), drafted two joint tasks, Dynamic ISR Support and Dynamic Targeting, for USJFCOM. JT&E enhancements were paramount in the exercise because they enabled 9AF to include OIF lessons learned. Findings during exercise planning led to preliminary recommendations relative to future JNTC events and JTTs for TST.

JC2ISR efforts in CJTFEX 04-2 contributed to a more robust test. JC2ISR also drafted Commander, Second Fleet (C2F)/9AF U.S. Central Command Air Forces TST Concept of Operations for CJTFEX 04-2. JC2ISR drafted exercise CONOPS/TTPs for chat protocol and target kill removal and provided the TST Opposing Force mobile targets set to include location, movement, and daily threat. JC2ISR efforts to integrate the National Geospatial Agency and Distributed Common Ground/Surface System Family of Systems into the CJTFEX 04-2 architecture enhanced TST operations and lead to substantial findings. JC2ISR developed DCGS objectives and assessment drafts, DCGS CONOPS, and related TTPs.

JC2ISR received well-deserved accolades for management and development of the Test Control and Analysis Cell (TCAC) at CJTFEX 04-2, and the TCAC concept has been highly recommended for inclusion in future exercises. In addition, JC2ISR's active participation in the Air Land Sea Application Center's effort to draft TST multi-Service TTPs (MTTPs) not only helped form the basis for the subsequent revision and updating of joint publications by the Joint Warfighting Center at USJFCOM, but TST MTTPs for the NATO publication on TST procedures.

TEST AND EVALUATION ASSESSMENT

JC2ISR developed numerous products for the Joint Staff, combatant commands, Services, national agencies, and other JT&E efforts. JC2ISR developed an ISR/TST operations integration process model as a tool to effectively evaluate joint C2ISR improvements in TST prosecution. Perhaps the most enduring product is the JC2ISR test and analysis methodology that, for the first time, integrates the rigors of joint testing with the training of personnel in a JNTC event that incorporates methods to reflect enhancements from lessons learned during recent combat operations and previous tests. In general, JC2ISR test products provide warfighters with a baseline effectiveness evaluation of current C2ISR capabilities and limitations, and quantify the effects of specific C2ISR enhancements to improve TST.

Joint Cruise Missile Defense (JCMD)

SUMMARY

- JCMD is a five-year test that is in its final year of execution. It is located at Eglin AFB, Florida. The Air Force is the lead Service. JCMD has completed two simulation tests and two major field tests.
- During FY04 the final field test was executed during CJTFEX 04-2. JCMD is completing data analyses and formulation of final recommendations and reports.
- JCMD's schedule was shortened by six months to accelerate delivery of final reports to the warfighter and initiate close down early.
- JCMD prepared and submitted a Transformation Change Proposal to JFCOM as part of the effort to transition the capability and products developed.
- JCMD quantifies the effects of procedural and hardware enhancements to the Joint Integrated Air Defense System (JIADS) in a cruise missile defense role and makes recommendations to Combatant Commanders and the Services.
- JCMD products provide warfighters with a baseline effectiveness evaluation of current JIADS capabilities and procedures to meet the requirements of the JCMD mission area.

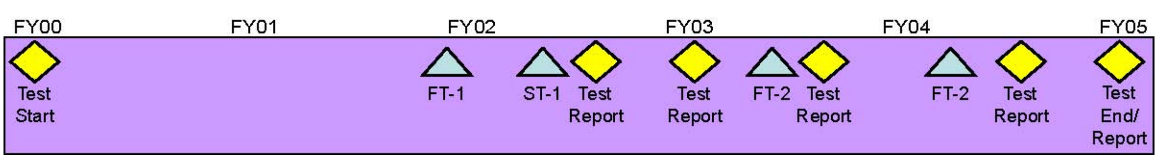
Phase 2 [testing] evaluated the value of identified enhancements and provided the Combatant Commanders with both an assessment of the near-term (FY04) capabilities as well as recommendations for further areas of improvement.

TEST DESCRIPTION AND MISSION

JCMD was chartered to employ multi-Service and other DoD agency support, personnel, and equipment to investigate and evaluate the operational effectiveness of joint operations against land attack cruise missiles (LACMs).

JCMD provides crucial information on near-term LACM defense capabilities and supports future architecture, technologies, and operational concepts. The basic JCMD test approach integrates a series of field tests and simulations in three phases to answer the program issues. Phase 0 addressed risk-reduction and ensured the program was prepared to collect and assess JIADS LACM capabilities. Phase 1 assessed JIADS current capabilities and identified potential problem areas and enhancements. Phase 2 evaluated the value of identified enhancements and provided the Combatant Commanders with both an assessment of the near-term (FY04) capabilities as well as recommendations for further areas of improvement.

TEST AND EVALUATION ACTIVITY



JCMD Phase 1 activities took place in FY02. Field Test 1 was conducted in FY03 as part of the U.S. Joint Forces Command (JFCOM) Joint Combat Identification Evaluation Team (JCIET) event in Gulfport, Mississippi. Field Test 1 assessed the current JIADS cruise missile defense capability in a live test environment using operational forces and an operationally representative scenario. JCMD flew BQM-74E (unmanned drones) and BD-5J (manned micro jets) to

represent the current land attack cruise missile threat. More than 25 sorties were flown over land and sea, simulating surface and air launched land attack cruise missile profiles.

JCMD's second Phase 1 test in FY02 was a simulation evaluation of the JIADS. JCMD executed Simulation Test 1 in September 2002, at the Boeing Virtual Warfare Center (VWC), St Louis, Missouri, and the Aegis Training and Readiness Center, Dahlgren, Virginia. Operator-in-the-Loop (OITL) systems in the evaluation included the Joint Air Operations Center, Tactical Air Operations Center, Patriot, Airborne Warning and Control System, F-15C, Air Battle Management Operations Center, and Aegis Command Information Center.

JCMD Phase 2 test took place in FY04 and assessed the enhanced JIADS capability. JCMD conducted Simulation Test 2 in March 2004, with the hub of operations at the Virtual Warfare Center. Simulation Test 2 integrated eight sites across four time zones via the Joint Distributed Engineering Plant bridged with the Navy Distributed Engineering Plant. These facilities include the VWC, the AWACS Integration Lab in Seattle, Washington; the Aegis Training and Readiness Center in Dahlgren, Virginia; the Distributed Mission Operations Center in Albuquerque, New Mexico; the C4I Enterprise Integration Facility (CEIF) at Hanscom AFB, MA; the E-2C System Test Evaluation Lab (ESTEL) at Patuxent River, Maryland; and the Patriot simulation at Ft. Bliss, Texas. This robust distributed OITL JIADS simulation immersed more than 100 operators in an integrated air and missile threat environment, which included fixed wing, theater ballistic missiles, ship attack cruise missiles, and land attack cruise missiles.

JCMD's Field Test 2 was conducted along the East Coast of the United States in June 2004 in conjunction with the Combined Joint Task Force Exercise 04-2 administered by Joint Forces Command (JFCOM) with 2nd Fleet being the primary executive agent. JCMD provided the Small Manned Aerial Radar Target Model-One as a cruise missile surrogate to fly against JIADS. In addition to flying 100 cruise missile sorties, JCMD demonstrated the Remote Operations Center capability by supporting the Joint Theater Air and Missile Defense daily After Action Review.

TEST AND EVALUATION ASSESSMENT

JCMD enhances the capability of U.S. JIADS to defeat a cruise missile attack. After evaluating baseline JIADS capabilities and procedures to meet cruise missile defense mission area requirements, JCMD quantifies the effects of procedural and hardware enhancements to JIADS in a cruise missile defense role and makes recommendations to Combatant Commanders and the Services. JCMD products provide warfighters with a baseline effectiveness evaluation of current JIADS capabilities and procedures to meet the requirements of the JCMD mission area. JCMD's final report to be published in March 2005 will report the effects of concept of operations and TTP changes as well as command and control, sensor, and shooter system enhancements to the JIADS in a cruise missile defense role.

Joint Datalink Information Combat Execution (JDICE)

SUMMARY

- JDICE is a three-year test in its second year of testing. It is headquartered at Nellis AFB, Nevada. The Air Force is the lead Service.
- JDICE was chartered six months early as part of the JT&E re-engineering process and conducted its first test within seven months after chartering.
- JDICE test concept is based on empirical testing during three live mini-tests and a field test using current joint warfighters, their fielded systems, and realistic targets.

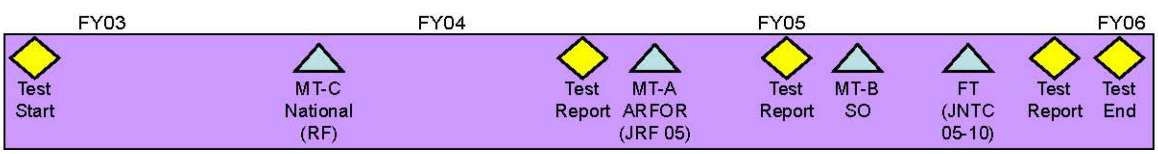
The objective of Mini-Test A is to integrate filtered ground picture information on the Link 16 net with the targeting and de-confliction information.

TEST DESCRIPTION AND MISSION

The purpose of JDICE is to improve the Joint shooter's tactical situational awareness. JDICE does this by developing, testing, evaluating, and institutionalizing Joint and Service tactics, techniques and procedures (TTPs) that provide actionable mission information across multi-platform, fielded, tactical air and ground data links specifically focused on improving the tactical user's combat employment capability. JDICE will specifically determine if the expanded application of Link 16 improves joint targeting and deconfliction processes. JDICE disseminates interim test results via quick look reports, test event reports and a Final Test Report. The JDICE Joint Test is sponsored by the Air Warfare Center, and supported by Air Combat Command (ACC) and USAF/XI.

In order to provide for accelerated testing, JDICE is using an "out-of-the-box" approach, using typical Tactics Development and Evaluation and qualitative methods. The test team is documenting the methodology used to accomplish this effort in the shortened time frame.

TEST AND EVALUATION ACTIVITY



JDICE selected each mini-test focus as a direct result of the Advanced Working Group and Joint Warfighter Advisory Group inputs. The Army Forces/Marine Forces test event is the most involved mini-test (Mini-Test A) and therefore, will be accomplished after the initial Mini-Tests C and B. Simply stated, the objective of Mini-Test A is to integrate filtered ground picture information on the Link 16 net with the targeting and deconfliction information tested in Mini-Tests C and B. This information is not currently on the Link 16 network and is not effectively transmitted to the tactical level combatant.

Mini-Test B integrates Special Operation Forces (SOF) forces into the targeting and deconfliction equation. The objective of Mini-Test B is to integrate SOF forces in the joint employment campaign plan with emphasis on reduction in probability of friendly fire incidents and optimization of passing SOF derived mission information to joint shooters. Mini-Test A will consider several of the actionable information paths looked at in the completed mini-test and add rapid ground force movement into the equation. JFC prioritization is required to focus the application of the JDICE TTP development methodology to develop TTPs to move actionable information designated by the JFC to the tactical level shooters via Link 16.

Mini-Test C, the first JDICE test, prioritized passage of National asset information. The objective of Mini-Test C provided a usable real-time emitter picture to tactical level shooters and passed applicable actionable information to tactical level combatants. This information previously only existed at operational levels, but not at tactical levels.
JDICE conducted Mini-Test C at Nellis AFB, Nevada, from October to November 2003 in conjunction with Red Flag 04-01 and included dedicated test assets from the 422 Test and Evaluation Squadron, Navy fighter aircraft from Fallon Naval Air Station, along with normal Red Flag participants. The second week of Mini-Test C was a dedicated JDICE test and evaluation on the Nellis Test and Training Range to ensure that JDICE generated statistically significant data to support testing requirements.

Mini-Test C was designed to flow quick look results directly into scheduled Air Force and Navy JTTP conferences covering Space, Command and Control, and Fighter mission areas. This immediate feedback enabled new and proven JTTP and TTP development methodology to be rapidly disseminated to all Joint combatants and applicable Service components. Operational constraints, TTP development methodology, and other limitations discovered during the test serve as a foundation to evolve the role of Link 16 in modern warfighting, and potentially influence ongoing and future machine-to-machine acquisition strategy.

JDICE briefed the 2004 ACC Weapons & Tactics Conference in January 2004. The Al Udeid CAOC/CC, was so impressed by the project's positive impact on the warfighter, that he requested a copy of the JTTP in order to immediately implement them in Al Udeid.

TEST AND EVALUATION ASSESSMENT

JDICE is finalizing the Detailed Test Plan in preparation for the execution of Mini-Test A. Venues for the March 2005 Test will be Joint Red Flag, Joint Roving Sands, USA NTC, and USMC CAX. In addition to these JNTC venues, portions of Mini-Test A will also be conducted in conjunction with the USMC's MAWTS-1 syllabus at Yuma.

Mini-Test B, originally planned for summer 2004, was postponed because test assets received higher priority real-world tasking. The DTP for Mini-Test B is completed and approved, and JDICE is awaiting final determination of the test venue. Risk reduction sorties began June 04, in conjunction with 422 Test and Evaluation Squadron and VX-31 TD&E sorties at Nellis AFB, Nevada. The risk reduction effort verified CAOC-N procedures and connectivity to Link 16, test instrumentation, database procedures, test procedures, aircraft Link 16 capabilities, data collection procedures, and JTTP procedures. JTTP development methodology used for Mini-Test C is the baseline for Mini-Tests A and B.

Joint Global Positioning System Combat Effectiveness (JGPSCE)

SUMMARY

- JGPSCE was a five-year test that completed September 30, 2004. It was located in Kirtland AFB, New Mexico. The lead service was the Air Force.
- The JGPSCE JT&E conducted field test events representing three types of combat operations: (1) Small Scale Contingency; (2) Limited Engagement; and (3) Major Theater War.
- Field testing discovered potential weapon systems vulnerabilities under conditions of GPS degradation and denial; JGPSCE published quick look test results that provided invaluable and timely information to the warfighter currently in theater.
- JGPSCE completed closedown activities and transitioned its knowledge base and data repository to the Office of the Assistant Secretary of Defense for Networks and Information Integration (ASD(NII)) sponsored transition team with a planned integration into the U.S. Strategic Command (STRATCOM) in FY06.

JGPSCE executed the GYPSY DELTA field test as part of the Joint Forces Command Combined Joint Task Force Exercise 04-2 in June 2004.

TEST DESCRIPTION AND MISSION

The JGPSCE JT&E was chartered July 1999 to evaluate the impact of electronic warfare (EW) targeted against global positioning system (GPS) receivers in joint operations. GPS provides highly accurate, real-time, passive, common-reference grid position and time information to military and civilian users worldwide. GPS enables the military forces to precisely determine their position, velocity, and time. Knowledge of the exact position and time is essential to reconnaissance and intelligence missions. Effective use of GPS will: (1) enhance command and control and assure coordinated battle tactics and support; (2) support strategic and tactical warfare; (3) allow efficient maneuvering on the battlefield; (4) provide accurate and timely fire support; and (5) facilitate combat service support operations.

Field tests addressed a specific combatant command’s theater of interest using: current tactics, training, and procedures; approved doctrine; actual concepts of operation; and “real” scenarios and threat lay-downs.

Each field test was designed to provide key information for warfighters to use in operational decision-making. The field tests employed open air GPS jamming representing real-world threats to evaluate the impact of GPS EW and electromagnetic interference (EMI) by comparing baseline performance to performance with EW and EMI present. Mitigation techniques and procedures were evaluated during test events, and the information was disseminated to the Services for incorporation into doctrine and tactics, techniques, and procedures. JGPSCE published quick look reports to the Services and the combatant commands immediately after each test event.

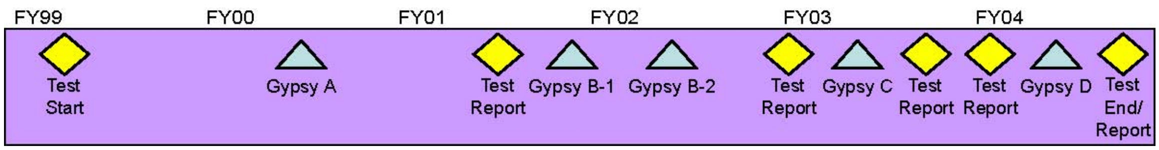
Phase 1 testing consisted of two live test events, GYPSY ALPHA and GYPSY BRAVO, at the tactical level of warfare. These tests focused on GPS EW and EMI vulnerabilities and mitigations for few-on-few engagements during small-scale contingency operations. Each live test in Phase l concentrated on portions of the sensor-to-shooter architecture. The GYPSY ALPHA field test, October and November 2000, exercised ground forces supplemented by limited airborne forces.

The GYPSY BRAVO field test was executed in two parts, January 2002 and July 2002, exercising airborne platforms delivering precision guided munitions.

Phase 2 testing consisted of one live test event, GYPSY CHARLIE, to evaluate integrated systems-of-systems tactical and operational-level mission performance during limited engagement operations. The GYPSY CHARLIE field test, September 2003, exercised the sensor-C2-shooter kill chain prosecuting time-sensitive targets.

Phase 3 testing consisted of a single test, GYPSY DELTA, to evaluate integrated tactical- and operational-level systems with warfighters performing missions during a major theater of war scenario. The GYPSY DELTA, June 2004, focused on the joint targeting cycle.

TEST AND EVALUATION ACTIVITY



JGPSCE completed the GYPSY DELTA field test in FY04, planned for JT&E closedown and transition, and conducted numerous briefings and presentations. JGPSCE briefed GYPSY CHARLIE test results to the Services and three combatant commands.

- JGPSCE published the GYPSY CHARLIE Quick Look Report, the GYPSY CHARLIE Test Report, and two vulnerability assessment reports for specified systems evaluated in the GYPSY CHARLIE field test.
- JGPSCE executed the GYPSY DELTA field test as part of the Joint Forces Command Combined Joint Task Force Exercise 04-2 (CJTFEX 04-2) in June 2004.
- JGPSCE published the GYPSY DELTA Quick Look Report.
- JGPSCE published the JGPSCE Joint Test Final Report including annexes on the GYPSY DELTA Test and the JGPSCE GPS Vulnerability Test Methodology.
- JGPSCE completed work on the Navigation Warfare Memorandum of Understanding Test, Trials, and Demonstrations Project Arrangement and the Test Methodology Project Arrangement.

TEST AND EVALUATION ASSESSMENT

JGPSCE provided rapid feedback to the warfighter community through quick look reports and briefings. JGPSCE addressed its three core issues through live test events:

- Evaluating joint warfighters performing operationally realistic tasks and missions under GPS EW and EMI.
- Evaluating effectiveness of tactics, techniques, procedures and mitigations employed by test participants in response to EW and EMI.
- Documenting and evaluating the effectiveness of the JGPSCE-developed GPS vulnerability test methodology.

JGPSCE test events produced significant data on the effects of GPS EW and EMI on systems and system-of-systems. JGPSCE provided data and feedback to the warfighter, acquisition, and test communities through a variety of products with sufficient detail to make them applicable to the respective system or program. Reports included five detailed test plans, four test event reports, seven vulnerability assessment reports, one investigation report, and a final test report. Other products include recommendations for Joint TTPs and Multi-Service TTPs, the GPS Vulnerability Test Methodology, the GPS Vulnerability Assessment Database, and the JGPSCE GPS data repository.

The JGPSCE team developed unique talents, capabilities, and testing expertise during the execution of this program. A DoD Selected Area Review on Navigation Warfare recommended an organization be established to ensure these capabilities are not lost. To capitalize on this recognized expertise, OUSD(NII) and STRATCOM committed to support the transition of the JGPSCE knowledge base to STRATCOM in FY06. OUSD(NII) took responsibility for supporting the JGPSCE transition effort in FY05.

Joint Integration and Interoperability of Special Operations (JIISO)

SUMMARY

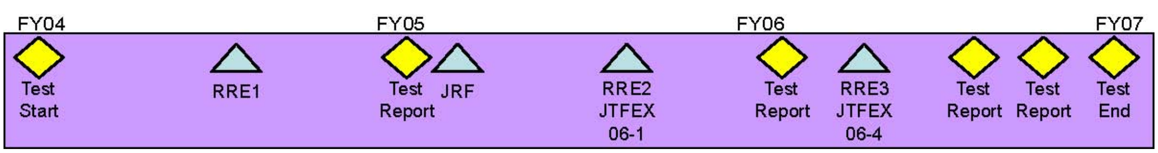
- JIISO is a three-year test currently in its first year of execution. It is located at MacDill AFB, Florida. The military lead is USSOCOM.
- Planning is for three field tests (JTFEX-series) supported by three risk-reduction periods.
- During FY04, JIISO observed JTFEX 04-2 as a risk-reduction event.
- In addition, JIISO held its first General Officer Steering Committee (GOSC) meeting, co-chaired by the Deputy Commanders of USSOCOM and USJFCOM, in Tampa, Florida.
- The GOSC provided guidance to revise the JIISO strategy to significantly accelerate product delivery to the warfighter.
- Accelerated products include delivery of a Special Operations Forces (SOF)and Conventional Forces (CF) Liaison and Coordination Handbook as a "quick-turn" product within six months, incorporating operationally proven ad hoc tactics, techniques, and procedures (TTPs) solutions that are widely accepted, but that have not yet been codified.
- In addition, incorporate enhancements to five specific TTPs in the first field test, enabling delivery of tested and evaluated enhancements to the warfighters shortly after the first field test.

TEST DESCRIPTION AND MISSION

The Joint Integration and Interoperability of Special Operations (JIISO) Joint Test and Evaluation (JT&E) was chartered in March 2004 to employ multi-Service and other Department of Defense (DoD) agency support, personnel, and equipment to investigate, evaluate, and make recommendations to improve the operational effectiveness of joint integration and interoperability of SOF and CF. Specifically, JIISO will test and evaluate the integration and interoperability of SOF and CF during the planning and execution of maneuver and fire support coordination during tactical operations.

USSOCOM is the lead Service for JIISO with USJFCOM as co-sponsor. JIISO is developing and enhancing TTPs; improving the supporting system-of-systems; and proposing, when appropriate, changes to doctrine, organization, training, materiel, leadership and education, and personnel, and facilities (DOTMLPF) that improve SOF and CF integration and interoperability during the planning and execution of maneuver and fire support coordination.

TEST AND EVALUATION ACTIVITY



During the first half of FY04, JIISO transitioned from a Joint Feasibility Study into a fully chartered JT&E project. JIISO conducted an operational workshop to add definition to the JIISO scope; held a JIISO Joint Warfighter Advisory Group conference to afford the Services and joint warfighters the opportunity to validate the proposed JIISO scope, test articles, and test venues and demonstrated JIISO technical feasibility and executability to the OSD JT&E Technical Advisory Board.

Following charter, JIISO began aggressively posturing for a successful three-year test by obtaining approval of the JIISO Program Test Plan and beginning execution of the plan. JIISO held a combined technical and operational symposium to validate the proposed objectives for the first risk-reduction laboratory event; vet TTP enhancements proposed for

inclusion in the first field test; vet the proposed contents of the JIISO quick-turn product (SOF and CF Liaison and Coordination Handbook).

TEST AND EVALUATION ASSESSMENT

JIISO emphasizes enhancements to maneuver and fire support coordination TTPs rather than the supporting tools and technology. While SOF and CF operations were previously deconflicted more through time and space separation than through a concerted effort to integrate operations, the JIISO intent is to move from a focus on deconfliction to a synergistic state of leveraging SOF and CF in current and future military operations.

Planned test deliverables include transformation change packages with DOTMLPF recommendations (including TTPs, training and education drivers, and materiel recommendations), validated TTP training packages, and "as-is" and "to-be" joint integrated operational processes and system views.

The JIISO test concept is based on three field tests over the course of the three-year test, each supported by a series of risk-reduction activities. Risk-reduction activities may include field observations, research, workshops, surveys, interviews, and laboratories. Laboratories will be used to validate data collection tools and processes, proof and refine proposed enhancements, and train operators on proposed enhancements before implementation in an exercise environment. JIISO will leverage scheduled joint exercises for field tests, with Joint National Training Capability exercises affording the best opportunity for testing based on force participation and receptiveness to including JT&E exercise objectives.

In keeping with JIISO GOSC guidance, the first JIISO test event will include the test and evaluation of enhancements to five specific TTPs compared with empirical insights from recent events. The warfighters, represented by the Joint Warfighter Advisory Group and GOSC, will validate JIISO conclusions and recommendations and provide the reference point for comparison of test results. JIISO will balance the production of a quick-turn (no-test) product with the effort required for detailed test planning for a successful first field test. Risk-reduction activities and results of previous field tests will identify integration and interoperability deficiencies. Based on these deficiencies, JIISO will develop process and system enhancements to be tested during the final two test events. Quick look and test event reports, validated by the warfighters, will be produced after each of the three field tests.

Joint Logistics Planning Enhancements (JLOG/PE)

SUMMARY

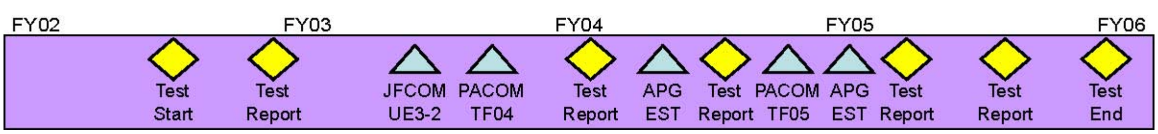
- JLOG/PE is a three-and-a-half year test that is currently completing its second year. It is located at Aberdeen Proving Ground, Maryland. The lead service is Army.
- Two test events are complete. The next test event is Terminal Fury executed in December 2004 and the final test event occurs during Terminal Fury, executed in December 2005.
- During FY04, JLOG/PE assisted the CENTCOM J4 staff in improving their process of acquiring and assimilating logistics information to provide a daily status to the CENTCOM leadership for current in-theater activities.
- To ensure JLOG/PE test findings were not exercise artificialities, a small team deployed to the CENTCOM Area of Responsibility to collect data on the joint logistics information and management processes. Analysis correlates the deficiencies identified during the exercises with those found in the real world.

The lab certification event was conducted in March 2004 at JLOG/PE Headquarters, APG, Maryland.

TEST DESCRIPTION AND MISSION

The JLOG/PE joint test was chartered in October 2002 to identify, test, evaluate, and recommend enhancements to joint logistics information and management processes through analysis of data from joint exercises, the Global War on Terrorism operations, and dedicated tests. JLOG/PE improves the Joint Force Commanders' (JFC) abilities to assess, plan for, and manage sustainment of in-theater forces. Recent operations, such as Operation IRAQI FREEDOM, as well as joint exercises, have demonstrated the need for improvements in both the exchange of logistics information between the Service components and the JFC, and in the joint logistics planning and management processes to aid the JFC J4 assessment of the sustainment of in-theater forces. Taken together, these define a requirement for more timely and accurate logistics information.

TEST AND EVALUATION ACTIVITY



During FY03-04, JLOG/PE established baseline joint logistic information and management processes by analyzing data and anecdotal observations gathered during JFCOM exercise Unified Endeavor 3-2, and U.S. Pacific Command exercise Terminal Fury 04 (TF04).

Following data collection, JLOG/PE conducted a laboratory certification event to certify that the JLOG/PE laboratory located at JLOG/PE Headquarters had the capability and fidelity to permit a replay of a joint exercise scenario as a dedicated test venue.

The lab certification event was conducted in March 2004 at JLOG/PE Headquarters, APG, Maryland. The test scenario was TF04, the USPACOM's number one, tier-1 level, joint exercise. PACOM staff observed the test event and concluded that the test venue did represent the TF04 exercise scenario.

The JLOG/PE Joint Warfighter Advisory Group Conference, April 2004, brought representatives from a wide range of joint and Service testing activities. Members of the JLOG/PE JT&E provided the baseline test findings and an overview on how JLOG/PE JT&E will test and evaluate potential enhancements.

The JLOG/PE Test Product Implementation Plan details the strategy for test product release and follow-through to the customer.

TEST & EVALUATION ASSESSMENT

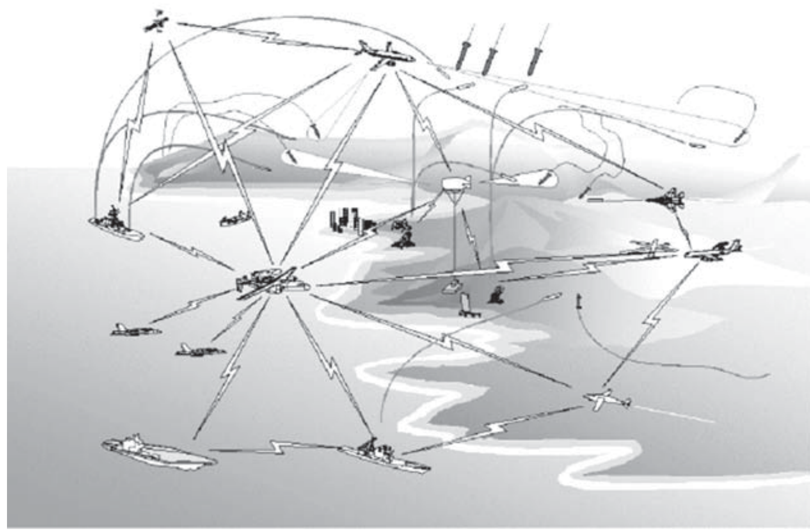
JLOG/PE testing assessed current joint logistics sustainment planning and management processes during the baseline tests. Deficiencies identified include difficulty obtaining logistics situational awareness, difficulty monitoring and assessing logistics status, difficulty estimating and calculating future consumption, lack of logistics simulation "realism" in exercises, and the individual training of newly assigned personnel augmentees. Enhancements to correct the deficiencies are under development. These enhancements will be tested during Terminal Fury 05, December 2005, and results reported.

Joint logistics sustainment planning and management process enhancements will improve warfighter capabilities. Results will manifest themselves in more agile forces that are able to effectively assess operational logistics requirements; improve preparedness of units being committed to operations; provide faster, more informed decisions; improve measurements of success; accelerate operational timetables; reduce risk; and project more capable forces requiring fewer resources. The JLOG/PE JT&E provides that level of utility in terms of process, best practices, analysis, and understanding as usable test products.

Joint Methodology to Assess C4ISR Architecture (JMACA)

SUMMARY

- JMACA is a four-year test that is currently completing its third year. It is located at Suffolk, Virginia. The Navy is the lead Service.
- Two validation tests have been completed. Execution of the final validation test is scheduled for FY05 during Red Flag 05.
- During FY04, conducted second validation test using the Combined Joint Task Force Exercise (CJTFEX04-2) that focused on Time-Sensitive Targeting, Close Air Support, and Combat Search and Rescue.
- Due to late force structure changes, conducted a re-assessment of the CJTFEX 04-2 architecture in less than three days providing updated end-to-end information paths with associated interoperability risk prior to exercise execution demonstrating rapid assessment capability.
- Results from initial validation testing demonstrated JMACA Methodology delivers the capability to rapidly assess Joint Task Force (JTF) architectures leveraging existing analytical tools and databases.

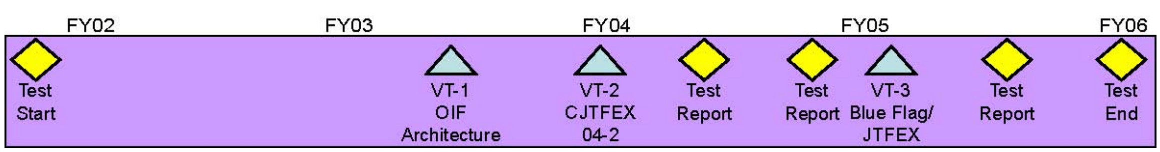


Results from initial validation testing demonstrated JMACA Methodology delivers the capability to rapidly assess Joint Task Force architectures leveraging existing analytical tools and databases.

TEST DESCRIPTION AND MISSION

JMACA was chartered in FY02 by DOT&E to test, evaluate, and enhance a set of tools and procedures to assess command, control, communications, computers, intelligence, surveillance, and reconnaissance (C4ISR) architectures. The charter designated the United States Department of the Navy (OPNAV N61) as the lead Service for the JMACA JT&E. The problem statement is: "The JTF commander has insufficient means to rapidly identify deficiencies and solutions within the C4ISR architecture." The purpose of JMACA is to provide the JTF Commander with a validated set of tools and procedures to rapidly assess JTF C4ISR architecture prior to employment.

TEST AND EVALUATION ACTIVITY



During FY04, JMACA conducted validation testing following the JMACA Program Test Plan. The testing used the CJTFEX 04-2 exercise architecture in three distinct phases between April and August 2004.

- Phase 1 – The JMACA test team assessed the exercise architecture to identify deficiencies and evaluate analytical tools and procedures. Also, a select group of potential users provided feedback on suitability of the methodology.

- Phase 2 – The JMACA test team collected data in the exercise observing the end-to-end information paths between combat units.
- Phase 3 – Using Joint and Service system test beds, the JMACA test team collected data on selected end-to-end information paths not observed in the exercise.

TEST AND EVALUATION ASSESSMENT

Results from validation testing indicate the methodology successfully demonstrated the rapid, automated mining of Joint C4ISR system data for 100 percent of selected combat units of the CJTFEX 04-2 exercise supporting architecture development and analysis. In addition, the methodology extracted over 85 percent of associated system risk data for the C4ISR systems of selected exercise combat units quantifying system and information path interoperability risk supporting communications planning. The JMACA team also audited on-site 100 percent of the selected combat unit C4ISR systems for completeness and accuracy of the Joint and Service authoritative data sources providing confidence in automated data mining and subsequent analysis.

Joint Shipboard Weapons and Ordnance (JSWORD) Quick Reaction Test (QRT)

The shipboard operational demonstration will focus on issues related to personnel, training, ordnance assembly/load-out/ replenishment and validation of the final SSRA recommendations and process issues.

SUMMARY

- JSWORD is a quick reaction, ten-month test. It is headquartered in Suffolk, Virginia.
- JSWORD is sponsored by USSOCOM and executed by Commander, Operational Test and Evaluation Force (COTF).
- As a result of this QRT, USSOCOM should be able to operate and train from Navy ships without requiring waivers when using the 2.75-inch Folding Fin Aerial Rocket (2.75" FFAR).
- JSWORD will also determine if the developed and validated approval process for the 2.75" FFAR can be utilized to support certification of other munitions needed to support emergent contingency requirements.
- JSWORD will execute two demonstrations to validate the process. A ground-based risk mitigating demonstration focused on logistics and arming/de-arming procedures for USSOCOM, Army, and USMC helicopters operating aboard a U.S. Navy Amphibious Assault Ship. A shipboard operational demonstration to validate the JSWORD process and resolve any issues identified during the ground-based demonstration.
- Test results will provide empirical data to support findings, conclusions, and recommendations to the joint operational, training, and acquisition communities.

TEST DESCRIPTION AND MISSION

JSWORD was directed in May 2004 to establish, document, and publish a standard joint procedure for tube loading of the (2.75" FFAR on U.S. Army (USA) and USSOCOM helicopters. Operating procedures developed during this test shall be acceptable to both USSOCOM and Fleet Forces Command (FFC).

The results from JSWORD will provide procedures to mitigate the risks associated with the transportation, storage, handling, loading and unloading of the 2.75" FFAR during joint shipboard training and operations. One-time waivers for the 2.75" FFAR have been granted for each contingency without addressing the long-term problem. Without a formal process in place, USSOCOM and the Army are unable to conduct live-fire training exercises. Ships develop ad hoc procedures such as turning off radar and radio transmitters. These procedures increase the ship's vulnerability when unapproved munitions are on deck. The risk of accidental discharge due to radio frequency interference is unknown. The goal of the JSWORD QRT is to validate and verify the process which will quantify the risk, and to determine the changes needed for the associated Service publications.

Since June, JSWORD focused on an operational process solution, research, and data gathering. Baseline data has been gathered from lessons learned from USS *Kitty Hawk* during Operation ENDURING FREEDOM (OEF) and USS *America* contingency operations during Haiti. A Systems Safety Working Group (SSWG) has been formed and is responsible for conducting a Systems Safety Risk Assessment (SSRA), which involves compiling data regarding previous systems safety testing of the 2.75" FFAR and the associated weapons systems from all the Services.

TEST AND EVALUATION ACTIVITY

JSWORD completed the land-based demonstration in October 2004 at Fort Campbell, Kentucky, with participants from the 160th Special Operations Aviation Regiment (SOAR), an Army Apache Squadron, and the 2nd Marine Air Wing. Each type of helicopter used live and inert 2.75" FFAR rounds to:

- Compare the NAVAIRSYSCOM approved contingency checklists with current Joint and Service checklists. JSWORD observed and documented Army, USMC, and SOCOM procedures, compared those procedures to current contingency checklists, and practiced procedures that will be performed during the shipboard demonstration.
- Identify changes needed to improve and validate the NAVAIR checklists and focus on inter-service logistics, packaging, handling, stowage, and transportation of the 2.75" FFAR.
- Examine the safety, technical, and operational issues associated with inert and live cold/hot tube loading.
- Provide an initial validation of the technical information generated from the System Safety Risk Assessment (SSRA) that has been drafted by the SSWG.
- Brief the Naval Ordnance Safety and Security Activity regarding the results of the SSRA to prepare for the shipboard demo in 2005.

The shipboard operational demonstration, scheduled for January through February 2005 onboard USS *Nassau*, will focus on issues related to personnel, training, ordnance assembly/load-out/replenishment and validation of the final SSRA recommendations and process issues. The initial coordination meeting with USS *Nassau* has been completed. The 160th SOAR will support the shipboard demonstration. USA and USMC units are being identified.

TEST AND EVALUATION ASSESSMENT

The JSWORD SSRA document is providing great insight into various technical issues with the 2.75" FFAR onboard ship. The document addresses these vital areas:

- Risk assessment for specific aircraft platforms, fire control systems, and launchers (for SOF/USA/USMC).
- Fastpack packaging vice wooden boxes.
- Detailed systems description (including rocket, motor, warhead, fuse, etc.).
- Risk spreadsheets for component and sub-assemblies, hazard category, and corrective action mitigation focused on CVNs and amphibious class ships.

Continued assessment will be provided as JSWORD briefs the NOSSA and CNO N411. USSOCOM views this process along with the SSRA to provide critical information for the future certification of specific weapons (30 MM, 7.62" mini-gun, and other Special Operations Forces weapons) in the shipboard environment. JSWORD will close in March 2005.

Joint Space Control Operations- Negation (JSCO-N)

SUMMARY

- JSCO-N is a three-year test currently in its first year of execution. It is located at Colorado Springs, Colorado. The Air Force is the lead Service.
- Planning is for three Field Tests (Terminal Fury 05, 06, and Unified Endeavor 06).
- Field Test 1 will provide a mission area baseline to identify potential improvements for the joint warfighter.

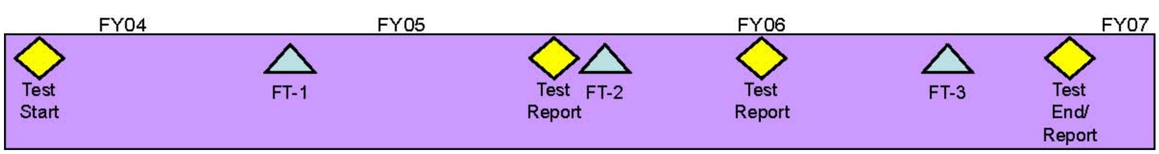
JSCO-N focuses on better synchronization of space control operations through the Theater Combatant Commander's joint targeting cycle.

TEST DESCRIPTION AND MISSION

JSCO-N was chartered in March 2004 to address the threat of an adversary using space to threaten friendly space-based services (imagery systems, satellite communications, and satellite navigation systems). JSCO-N is sponsored by Air Force Space Command and is actively supported by U.S. Army Space and Missile Defense Command and U.S. Naval Network Warfare Command. STRATCOM, as the mission area "owner," and PACOM are both collaborating with JSCO-N as well.

The Space Control mission area is defined as "combat and combat support operations to ensure freedom of action in space for the United States and its allies and, when directed, deny an adversary freedom of action in space" (Department of Defense Directive 3100.10, July 1999). JSCO-N addresses the "negation" function of the Space Control mission area. Space Control Negation (SCN) may target an adversary's space capability by using a variety of permanent and/or reversible means to achieve five possible effects: deception, disruption, denial, degradation, and destruction. Because these effects focus on attacking the adversary's ability to use the "high ground" of space to its advantage, SCN planning must be fully integrated into the Joint Force Commander's targeting cycle.

TEST AND EVALUATION ACTIVITY



JSCO-N is planning and conducting test activity to identify, evaluate, and document improvements to the planning and assessment of Joint SCN combat capability. JSCO-N focuses on better synchronization of space control operations through the Theater Combatant Commander's joint targeting cycle. Test results will provide empirical data with recommendations to the operational, training, and acquisition communities, and will support Doctrine, Organization, Training, Leadership, Material, Personnel, and Facilities as well as Transformation Change Package recommendations coordinated through JFCOM.

The JSCO-N made significant strides in drafting a concept document that captures current "best practices" in command and control of space control negation capabilities. JSCO-N has been conducting extensive coordination and liaison with space control negation operators and stakeholders. JSCO-N personnel have comprehensively researched doctrine, existing standard operating procedures, emerging concepts of operation, and lessons learned from exercises and operational contingencies. This knowledge is being distilled into an in-depth "Procedures Document" addressing Inputs, Outputs, and Operational and command and control architecture, complete with matrixes, templates, and checklists. Due to the fact that there are no standard procedures among the combatant Area of Responsibilities for performing SCN, the detailed information within the Procedures Document will fill this void for the first time. The JT&E will use this material to aid the JSCO-N Detailed Test Plan refinement and test article development. STRATCOM is incorporating this procedural summary into its Strategic Directive on space control operations. In addition, work is being conducted with JFCOM Air, Land and Sea Applications Center to initiate a multi-Service tactics, techniques, and procedures effort following the first test event and the validation of the procedures.

TEST AND EVALUATION ASSESSMENT

As one of the first JT&E efforts under the new streamlined JT&E process, JSCO-N has successfully established and positioned itself to produce test products quickly. In preparation for the first test, JSCO-N has been integrated into the Initial Planning Conference, Mid Planning Conference, and various working groups associated with Terminal Fury 05 to be held in PACOM in December 2004. JSCO-N has been accepted as a participant in this Tier 1 exercise.

The team has conducted risk-reduction strategies by imbedding personnel into two related activities (Joint Expeditionary Forces Experiment 04 and the Schriever III Wargame and associated seminars, that will illuminate potential space control test articles that may be factors in our TF-05/06 field tests).

The third Joint Warfighter Advisory Group's was conducted in June 2004 and the fourth is planned for October 2004. Primary topics discussed at the JWAG included test design, draft command and control processes, data collection and analysis methodology.

JSCO-N's first General/Flag Officer Steering Committee (GOSC) is scheduled for October 2004. The JSCO-N GOSC is an advisory body that provides a forum for senior-level counsel and advocacy from the Military Services, the Unified Commands, and Department of Defense Agencies.

Joint Unmanned Aerial Vehicle in Time-Sensitive Operations (JUAV-TSO)

SUMMARY

- JUAV-TSO is a three-and-a-half-year test that is currently completing its final year. It is located at Fallon NAS, Nevada. The Navy is the lead Service.
- JUAV-TSO has completed two mini-tests and two field tests to date. Completing final phase of validation test in October 2004. Data analyses and final report have been accelerated by six months allowing for early shutdown of the test and transition of products to the warfighter.
- During FY04, conducted Field Test 2.
- JUAV-TSO implemented a test program to develop, refine, evaluate, and validate weapon-delivery methods, communications systems, control relationships, and command structures.

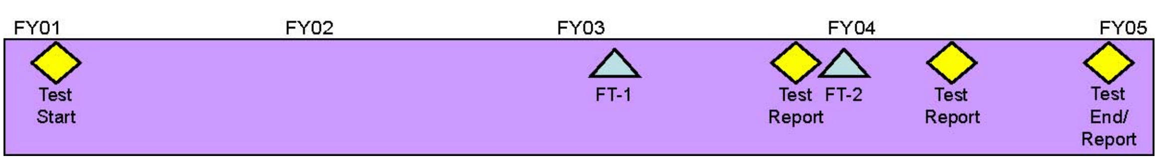
JUAV-TSO testing involves fixed-wing and rotary-wing air interdiction, artillery fire support, close air support, and personnel recovery within three command and control architectures.

TEST DESCRIPTION AND MISSION

The JUAV-TSO was chartered August 2001 to employ multi-Service and other Department of Defense agency personnel, support, and equipment to develop and document joint tactics, techniques, and procedures (JTTPs) for current and proposed tactical unmanned aerial vehicles (UAV). Historically, UAV mission areas included intelligence, surveillance, and reconnaissance. DESERT STORM in the Persian Gulf, Operations ALLIED FORCE in the Balkans, ENDURING FREEDOM in Afghanistan, and IRAQI FREEDOM showed the ability to expand UAV tactical employment during dynamic, time-sensitive, joint operations.

JUAV-TSO testing involves fixed-wing and rotary-wing air interdiction, artillery fire support, close air support, and personnel recovery within three command and control (C2) architectures. These architectures place weapon engagement decisions at various C2 nodes throughout JUAV-TSO-planned test events.

TEST AND EVALUATION ACTIVITY



FY04 testing included a JUAV-TSO JT&E capstone Joint Validation Test Event (JVTE). JVTE output is a set of JTTPs, provided to doctrine writers at the Air Land Sea Application Center, JFCOM, and the Services.

JUAV-TSO conducted FT-2 in conjunction with Marine Aviation Weapon and Tactics Squadron, Weapons and Tactics Instructor class 2-04 in Yuma, Arizona, in April 2004. JUAV-TSO conducted a multi-phased JVTE focused on data collection and validation of proposed JTTPs. JUAV-TSO subject matter experts developed a set of proposed JTTPs (during previous test events) for integrating UAVs into each mission area. JVTE was an opportunity to validate selected JTTPs.

In late January 2004, JUAV-TSO subject matter experts participated in a Global Hawk Air Force Tactics, Techniques, and Procedures 4-1 development conference at Nellis AFB, Nevada. This conference was the first opportunity for JUAV-TSO to directly influence the development of TTPs. JUAV-TSO's contribution was praised by the Global Hawk community. JUAV-TSOcontinues to work closely with the USAF Remotely Piloted Aircraft Center of Excellence (RPA COE) at Nellis AFB.

In FY04, JUAV-TSO supported numerous U.S. Navy Carrier Air Wing flight operations at Fallon by providing UAV system assets to augment pre-deployment training activities. While not considered structured JT&E events, flight operations provided the operational community venues in which to integrate a UAV platform into multiple training scenarios and JUAV-TSO staff opportunities to observe integration. Knowledge gained from these training events was used to refine planning activities associated with future JUAV-TSO field and validation test events.

TEST AND EVALUATION ASSESSMENT

JUAV-TSO products completed during FY04 include the JUAV-TSO MT-2 Report, the JUAV-TSO FT-2 Quick Look Report, and the FT-2 Test Event Report. To date, JUAV-TSO has evaluated the ability of tactical leaders to effectively and efficiently utilize UAVs in a tactical role within three C2 architectures. JUAV-TSO will develop joint, platform-independent TTPs for UAVs. These JTTPs will improve UAV employment in time-sensitive joint operations, with emphasis on air interdiction, fire support, and personnel recovery missions. JUAV-TSO maintains strong relationships in support of the JUAV-TSO mission to employ multi-Service and other DoD agency personnel, support, and equipment to develop and document JTTPs for current and proposed DoD UAVs in the tactical class of vehicles. All JUAV-TSO tests have produced invaluable data supporting the integration of time-sensitive tactical UAV operations in the warfighting community. The JUAV-TSO completion date is April 2005.

Information Assurance

Information
Assurance

Information Assurance (IA) and Interoperability Evaluations During Combatant Command and Service Exercises

SUMMARY

- DoD is improving its IA and interoperability postures, but the information operations (IO) threat continues to increase in capability and in ability to rapidly exploit new vulnerabilities.
- Operational assessments of IA/interoperability during Combatant Command (COCOM) and Service exercises promote identification and resolution of problems that could impact warfighter mission accomplishment.
- A full assessment cycle of Blue (vulnerability assessment), Green (train and assist), and Red (threat penetration assessment) teaming provides the most comprehensive assessments and the greatest opportunity to improve IA and interoperability postures.
- Most of the vulnerabilities found to date are basic problems with readily available solutions.
- Exercise authorities appreciate and desire more Operational Test and Evaluation (OT&E) expertise during their exercise planning, execution, and assessment phases. COCOM and Service requests have grown to 28 events for FY05.
- Assessment methodology and metrics continue to mature and be tailored to the exercise environment and the needs of supporting organizations across DoD.

BACKGROUND

The FY03 Appropriations bill directed that the COCOMs and Services conduct operationally realistic IA and interoperability evaluations during major exercises. The bill directed the Service Operational Test Agencies (OTA's), the Service Information Warfare Centers, and the National Security Agency (NSA) assist in the planning, conduct, and evaluations of these exercises. DOT&E's responsibility consists of overseeing these efforts and providing annual updates on DoD's progress based on results of the exercise evaluations and OT&E. DoD has programmed $156M through FY09 for this initiative, $18M of which was funded in FY04.

The bulk of the FY04 funds were distributed to the OTAs, who in turn assembled teams with the expertise to perform IA and interoperability assessments before and during exercises. These teams plan, execute, collect data, analyze, and report the results of all activities associated with IA and interoperability assessments. The following describes the planning and assessment methodology employed by the OTAs for a given exercise:

- Actively participate in all exercise planning conferences beginning with the Concept Development Conference. Early involvement results in greater likelihood that realistic Red Team penetration events will be synchronized with the exercise scenario and data collection requirements are supported.
- Design a comprehensive Red Team scenario overlaid on the exercise scenario to examine the performance of operational networks and operators when subjected to information operations attacks. Red Team events that provide multi-echelon stress with multi-level threats enhance the warfighter's appreciation for the rapidly evolving threat, and solidify their training and capabilities in all aspects of "protect, detect, react, and restore" missions.
- Design an interoperability assessment plan in coordination with the Joint Interoperability Test Command.
- If full Red Team penetration activities are appropriate and approved, activate the Red Team approximately nine months in advance of the exercise.
- Conduct an administrative Blue Team vulnerability assessment approximately six months prior to the exercise, providing feedback to the exercise authority for remedial actions in advance of the exercise; special focus is paid to ensure prior issues have been resolved. Interoperability reviews and certification efforts may also be included during the Blue Team phase.
- Provide Green Team assistance to the exercise authority in understanding the nature, priority, and remedial activities associated with identified vulnerabilities.
- Coordinate external support for solutions beyond the organic capabilities of the exercise authority and assist in the identification of sources for any needed training.
- During the exercise, execute the Red Team events safely, legally, and consistent with the exercise objectives.
- Capture relevant IA and interoperability data, analyze results, and support trend analyses.
- Provide quick-look feedback to the exercise authority and participants, and support after-action reviews.

- Prepare reports that inform exercise participants, system administrators, and leadership.
- Identify problems that require external solutions and provide appropriate results to developers and sponsors who will construct solutions and prioritize efforts.
- Update databases, compare performance with rolling baseline, and perform trend analysis. Provide all results to DOT&E.
- Recommend activities for the next cycle (e.g., more stressing or operationally focused Red Teaming).
- Begin the next cycle.

FY04 ASSESSMENT ACTIVITIES

In this fiscal year, the OTA teams have grown significantly, as have the relationships with COCOMs and other critical partner organizations such as the NSA, the Service Information Warfare Centers, the Defense Intelligence Agency (DIA), and the Defense Information Security Agency (DISA). Accomplishments by the OTA Teams and their partners include the following:

- Performed full Blue/Green/Red Team assessments for 6 exercises (see Table 1).
- Performed Blue/Green Team assessments for 12 exercises. Another four exercises were observed for future assessment.
- Observed and assisted in exercises that have (or offer future opportunity for) Red Teaming.
- Developed IA and interoperability metrics that are observable in the exercise environment, meaningful to the warfighter, and suitable for performing baseline assessments and trend analyses.
- Developed an evaluation-plan template and an exercise-planning checklist to bring appropriate levels of analytical rigor to exercises.
- Coordinated with acquisition elements in their commands to share best practices, metrics, and lessons learned from COCOM and Service exercises.
- Initiated a working group to identify critical mission thread information that will support both IA and interoperability assessment planning.
- Initiated a working group to identify most effective and affordable candidates for Blue Team tool kits.

The NSA and the Service Information Warfare Centers are refining a training and certification program to expand Red Team resources available to support assessment activities. They are also developing new tools and methodologies to stress the exercise participants. DIA continues to provide critical support to this initiative via the Joint Information Operations (IO) Threat Working Group, and has committed to provide a comprehensive IO Threat Capabilities Assessment update every six months. The DIA assessments are essential to proper portrayal of the IO threat for the exercises associated with this effort, and also in all of the formal OT&E for DoD's acquisition programs.

DOT&E has increased the focus on IA as an evaluation issue for systems on the OT&E oversight list. DOT&E identified a dozen acquisition programs in FY04 for an expanded review of the adequacy of IA evaluation planning and to confirm appropriate IA OT&E metrics were in use. This effort included review of Test and Evaluation Master Plans, Test Plans, and Defense Information Technology Security certification and Accreditation Process documentation. The OTAs are performing similarly expanded efforts on selected acquisition programs, and both DOT&E and OTA efforts to heighten IA awareness in acquisition program planning will continue in FY05. The OTA teams also maintain awareness of results across the assessment initiative, and ensure that solutions and lessons learned in one theater are shared across other theaters.

The DOT&E policy for IA evaluations implemented in 1999 remains in effect, with an update currently in final coordination. The update incorporates new metrics and lessons learned from this initiative that are appropriate for acquisition OT&E.

Information Assurance and Interoperability Exercise Events for FY04			
COCOM	Exercise	OTA Lead	OTA Support
CENTCOM	Internal Look 05 Preparation (cancelled)	ATEC	N/A
EUCOM	Agile Response 04	ATEC	OPTEVFOR
	Austere Challenge 04	ATEC	JITC, AFOTEC
JFCOM	United Endeavor 04	OPTEVFOR	JITC, ATEC
	CJTF Exercise 04-02	JITC	OPTEVFOR
NORTHCOM	United Defense 04	ATEC	JITC, MCOTEA
	Salt Lake Shake 04	ATEC	JITC
	Determined Promise 04	ATEC	JITC, MCOTEA, OPTEVFOR
	Joint Warrior Interoperability Demonstration 04	JITC	ATEC
PACOM	Terminal Fury 04	OPTEVFOR	JITC, ATEC
	RSOI 04 (PACOM HQ)	OPTEVFOR	ATEC, AFOTEC
	RSOI 04 (U.S. Forces Korea)	OPTEVFOR	ATEC
	Ulchi Focus Lens 04	OPTEVFOR	ATEC
	Cobra Gold 04	OPTEVFOR	
SOUTHCOM	Fuertas Defensas 04	ATEC	JITC, MCOTEA
SOCOM	TBD	JITC	
STRATCOM	Global Guardian 04	JITC	AFOTEC
	Austere Challenge 04	JITC	ATEC
	Amalgam Virgo 04	JITC	ATEC
TRANSCOM	Turbo Challenge 04	JITC	AFOTEC
Joint / Service	JNTC Horizontal One Exercise	MCOTEA	AFOTEC, ATEC
	Asynchronous Warfare Initiative (AWI)	OPTEVFOR	JITC
	Marine Expeditionary Force Exercise 04	MCOTEA	
	HMX-1 Network Vulnerability Assessment	MCOTEA	JITC
	JNTC Horizontal Two Exercise	MCOTEA	AFOTEC, ATEC

CENTCOM	Central Command
EUCOM	European Command
JFCOM	Joint Forces Command
NORTHCOM	Northern Command
PACOM	Pacific Command
SOUTHCOM	Southern Command
SOCOM	Special Operations Command
STRATCOM	U.S. Strategic Command
TRANSCOM	U.S. Transportation Command

JITC	Joint Interoperability Test Command
AFOTEC	Air Force Operational Test and Evaluation Center
ATEC	Army Test and Evaluation Command
MCOTEA	Marine Corps Operational Test and Evaluation Agency
OPTEVFOR	Operational Test and Evaluation Force

FY05 GOALS AND PLANNED ASSESSMENT ACTIVITIES

FY05 funding for this initiative is programmed at $23M. Assessment plans for FY05 include 15 exercises with active Blue, Green, and Red Teams (full assessment support), and 13 additional exercises with lesser efforts (see Table 2). Based on current projections and planned levels of effort, this funding level appears to be adequate for FY05. However, the

response from exercise authorities continues to be very positive, and additional resources may be required to provide the full assessment support to more than twenty exercises.

In a merger of acquisition and exercise support, the Navy's Operational Test and Evaluation Force will examine several acquisition programs (e.g., Deployable Joint Command and Control IOT&E, Navy Marine Corps Internet FOT&E) during COCOM exercises. We are optimistic that many training and test objectives can be simultaneously satisfied during combined events, and that the efficiencies provided to the Department are potentially significant.

Planned Information Assurance and Interoperability Exercise Events for FY05

COCOM	Exercise	OTA Lead	OTA Support
CENTCOM	Internal Look 05	ATEC	
	United Endeavor 05	ATEC	
EUCOM	Flexible Leader 05	ATEC	OPTEVFOR
	Sharp Focus 05	ATEC	JITC, AFOTEC
JFCOM	United Endeavor 05	OPTEVFOR	JITC, ATEC
	JTF Exercise 05	JITC	OPTEVFOR
NORTHCOM	United Defense 05	ATEC	JITC, MCOTEA
	Northern Edge 05	AFOTEC	JITC
	Joint Warrior Interoperability Demonstration 05	JITC	ATEC
PACOM	Terminal Fury 05	OPTEVFOR	JITC, ATEC
	RSOI 05 (PACOM HQ)	OPTEVFOR	ATEC, AFOTEC
	RSOI 05 (U.S. Forces Korea)	OPTEVFOR	ATEC
	Ulchi Focus Lens 05	OPTEVFOR	ATEC
	Talisman Sabre 05	OPTEVFOR	
	Cobra Gold 05	OPTEVFOR	
SOUTHCOM	Fuertas Defensas 05	ATEC	JITC, MCOTEA
SOCOM	TBD	JITC	
STRATCOM	Global Guardian/Lightning 05	JITC	AFOTEC
	Global Archer 05	JITC	ATEC
TRANSCOM	Turbo Challenge 05	JITC	AFOTEC
Joint / Service	JNTC Exercise 05-01	MCOTEA	AFOTEC, ATEC
	Asynchronous Warfare Initiative (AWI)	OPTEVFOR	JITC
	Marine Expeditionary Force Exercise 05-01	MCOTEA	
	HMX-1 Network Vulnerability Assessment	MCOTEA	JITC
	Positive Force	JITC	ATEC
	JNTC Exercise 05-02	MCOTEA	AFOTEC, ATEC
	Keen Sword	COTF	ATEC
	Roving Sands	JITC	AFOTEC
	Marine Expeditionary Force Exercise 05-02	MCOTEA	

ASSESSMENT

DOT&E is developing a database to capture baseline performance data for events assessed to date. These data will be aggregated to support trend analyses for recurring events and across like events in the future. Emerging trends across FY04 events for which data is available include the following:

- Vulnerabilities have been found by every Blue and Red Team associated with this initiative.
- Most problems found are basic (e.g., unprotected servers and open ports, Intrusion Detection Systems not installed or improperly configured, etc.) and easily remedied by trained system administrators.
- There is unfounded trust that certain networks are inherently secure and remote monitoring is always effective. These combine to reduce vigilance by local operators, and set the stage for penetrations to go undetected.
- Corrective-action management is sometimes lacking; some identified problems are not being fixed, and some that have been fixed get reintroduced when backup or update disks are loaded.
- Tactics, techniques, and procedures for detect, react, and restore missions are generally immature and/or not well understood by operators.
- Responsiveness to solving problems found in networks during operational exercises, or when focused follow-up is provided, is excellent.

These results have been shared both with the exercise authorities and with our initiative partners in the Joint Staff and the Defense IA Program in ASD(NII). Our partners are becoming more closely aligned with this initiative and exploring new ways to use the available results and influence focus areas for future events. They are also employing these results to support further activities and investments to improve DoD IA and interoperability postures.

Exercise authorities have demonstrated strong interest in applying remedies for identified vulnerabilities. We have observed significant improvements in IA posture between Blue and Red Team events for those exercises that have agreed to incorporate the full assessment cycle. We attribute this in part to the increased IA awareness among exercise participants that a full assessment brings to the exercise planning, but also to the increased command emphasis that is generally associated with the decision to have a full assessment. We also believe the focused Green Team and the synergy across all of the teams improves the likelihood that identified problems will be fixed, and repeat observations of the same problem will be minimized.

Although data at this time are limited, we are beginning to see trends for this initiative as portrayed by Figure 1. This chart plots IA Protect Posture as a function of the assessment level; IA Protect Posture is equated to the threat tier that our assessment teams determine a given set of exercise players could defend against. Threat tiers are defined as follows:

- Tier 1 = Basic level comprised of amateur hackers with no real agenda and limited resources
- Tier 2 = Medium level comprised of skilled hackers with an agenda, some resources, and possible sponsorship that includes intelligence support
- Tier 3 = High level comprised of experts with resources associated with nation state sponsorship

The first two assessment levels are based on observations from FY04 exercises, and can be explained as follows: those exercise authorities who agree to be subjected to Blue (and sometimes Red) Teams will more actively prepare their defenses, and as a result will be better able to protect their networks. The third assessment level is an extrapolation, but based on the data that show every Blue Team finds a vulnerability that could be exploited by a Tier 1 threat. And if there is no Red Team planned for the upcoming exercise, there may be little motivation to ready network defenses. These data indicate there is a strong correlation between IA Protect Posture and level of preparation, which is itself correlated to willingness to submit to Red Team attack.

In addition to Protect Posture, all of the OTA teams have also begun collecting data on Detect, React, and Restore Postures. Results for all of these IA mission domains will be addressed in my FY05 Annual Report.

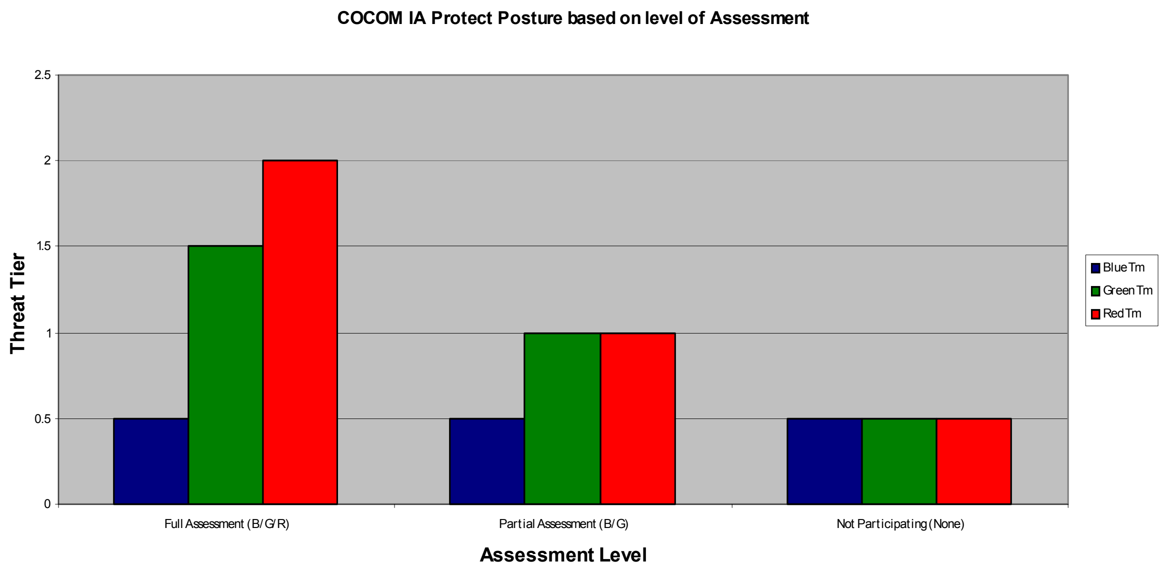


FIGURE 1

CONCLUSION AND RECOMMENDATION

There are many ongoing activities focused on improving DoD's IA and interoperability posture, and in the aggregate they are having positive effect. The OTA-led effort described in the preceding pages has already assisted in integrating and finding synergy among these efforts. Still, more must be done to deliver and maintain systems that are interoperable and information assured. The push to field emerging capabilities and commercial technologies, combined with the rapidly growing IO threat, will be a constant source of friction with the Department's information superiority goals, but one that can be best met with the fully engaged organizations involved in this effort.

The Department should continue to synchronize its many activities and leverage the results of the operational evaluations provided by this assessment initiative. Furthermore, in conjunction with other training objectives, IA should become an exercise objective (i.e., realistic Red Teaming should be present) wherever information is critical to mission accomplishment. Finally, we should accept that threat penetrations may occur when and where we least expect them; as such, more effort must be placed in preparing to detect, react, and restore critical services in the face of a successful attack. As previously discussed, this initiative is prepared to assess the ability of exercise participants in each of these domains.

Test Resources

Enhancing Test and Evaluation (T&E) for Joint Warfighting

Providing the Tools for Testing in a Joint Operational Environment

A key DoD tenet for the transformation of our military forces is strengthening our joint warfighting capabilities. Typical of the increasing emphasis on joint warfighting is the development of the Joint Capabilities Integration and Development System (JCIDS). JCIDS will be the process to identify joint warfighting capability gaps and, where material solutions are warranted, the weapon system developments to fill these gaps. The result will be defining weapon system capabilities in terms of their contribution to joint warfighting. Weapon systems are to be "born joint", fully integrated and interoperable with joint forces and operational concepts. This evolving approach will necessitate some changes in the way we conduct T&E.

Developing and fielding joint force capabilities requires adequate, realistic test and evaluation in a joint operational context. The T&E community must adjust test methods and develop the necessary test systems and tools to evaluate these joint capabilities. Currently, T&E focuses primarily on testing a single weapon system operating within the context of a single military service. From a resource perspective, an adequate capability to conduct operational testing in a joint environment will consist of several components:

- The optimal use of live forces to evaluate systems and systems-of-systems in a joint operational environment. Assembling the necessary joint forces for testing will always be a challenge. One way to meet this challenge is a greater use of Guard and Reserve forces in joint test events to enable us to "test like we fight". Another way is to use, where appropriate, joint training exercises such as those conducted by the Joint National Training Capability (JNTC).
- The use of common or interoperable test instrumentation. Wherever possible, future instrumentation must enable testing in a joint environment by being "interoperable" or common among the test, training, and experimentation communities and among Service facilities.
- The use of a persistent T&E networking infrastructure that links live systems with distributed virtual and constructive models and simulations. Live systems operating in live environments will remain the core of operational testing. However, a networked joint mission environment will enable the selective use of virtual and constructive models and simulations to augment the live test environment. A key tenet of this infrastructure is persistence so that it is readily available.
- The use of suitable models and simulations to enhance operational testing. To be of value, modeling and simulation representations of threats, environments, and systems must be readily available and effectively verified, validated, and accredited for use in operational testing.

Enhanced Partnerships with the Training Community

DOT&E continues to expand its relationship with U.S. Joint Forces Command (JFCOM). The past year has seen several significant areas of collaboration which include:

- Co-development of requirements for test and training ranges and facilities to support joint training, joint testing, and experimentation.
- Coordination of test and training range improvements needed to support joint training, joint testing, and experimentation.
- Cooperative planning for future joint exercises and experiments and execution of current events to ensure optimum utilization of existing capability.

DOT&E collaborated with JFCOM during the past year in examining common infrastructure approaches to meet the needs of both testing and training. Additionally, DOT&E continues to examine, in partnership with JFCOM, approaches to leveraging JNTC training events as venues to conduct T&E. This effort offers opportunities to significantly enhance the realism of the joint operational test environment while taking maximum advantage of available live forces for testing purposes. DOT&E continues to make major strides toward test and training range integration and interoperability.

T&E Resources and Facilities Challenges

The primary challenge regarding T&E resources will be to ensure T&E capabilities meet the demands of new warfighting technologies and evolving operational concepts. Adequate test capabilities must be in place, ready to test new systems throughout their development cycle. A number of test capability shortfalls limit the ability to conduct complete and adequate test and evaluation across a variety of warfare areas.

AIR WARFARE

T&E capability challenges in the area of air warfare include:

- Developing more effective threat simulators for missile warning and infrared missile countermeasures testing. Current methods for testing aircraft countermeasures against modern, seeker-aided surface-to-air threats are not adequate.
- Developing adequate and sufficient full-scale aerial targets. The Services have not yet agreed on an approach for replacing the dwindling inventory of QF-4 full-scale aerial targets. Current full scale targets do not satisfy future operational test and evaluation requirements for threat signature and performance.
- Developing adequate mobile ground targets. Adequately testing manned and un-manned aircraft in land attack mission areas requires high fidelity, remote-controlled surface targets, both expendable and reusable.
- Developing a capability to adequately test sensor-to-shooter networks. To adequately test networked sensors, command and control systems, and weapons, test ranges require upgrades that provide for improved on-range and off-range control, high-bandwidth data transfer, secure communications, and electromagnetic spectrum clearance.

LAND WARFARE

T&E capability challenges in the area of land warfare include:

- Developing Real-Time Casualty Assessment Instrumentation (RTCA). The Army's current RTCA has a number of significant shortcomings including spectrum encroachment, encryption vulnerability, and range and engagement fidelity limitations. Current RTCA cannot replicate the full range of combat interactions to include air-to-ground and ground-to-air engagements.
- Developing instrumentation for beyond line-of-sight engagements. Current testing of ground-to-air and ground-to-ground beyond-line-of-site weapons at standoff ranges is a challenge for existing tracking and data collection systems. Ranges require upgrades and investment in new technologies to provide extended range exercise control.
- Developing a more robust Intelligence, Surveillance, and Reconnaissance (ISR) T&E capability. Network-centric operations and the increasing capability and complexity of ISR systems requires a more complex and integrated test environment with improved multi-spectral threat signatures.
- Developing adequate Military Operations in Urban Terrain (MOUT) test facilities. Current MOUT facilities are not adequately instrumented for T&E. Additionally, existing MOUT facilities lack size and diversity in urban terrain.
- Developing adequate Electronic Warfare environments for T&E. Network-centric operations increase the potential vulnerability of systems to electronic warfare threats. The test infrastructure to evaluate these vulnerabilities is not adequate and open-air jamming restrictions make it very difficult to conduct testing near major population centers. T&E of network radios and GPS systems is conducted with synthetic jamming, but there is no synthetic capability for testing radios operating above 250 MHz.
- Developing adequate mobile targets with common control systems to increase both efficiency and flexibility. A common set of targets that can be controlled on any test range or training range does not exist.

NAVAL WARFARE

T&E capability challenges in the area of naval warfare include:

- Developing upgrades to littoral/shallow water T&E capabilities. The Navy lacks the capability to conduct instrumented, distributed littoral/shallow surface and underwater T&E over large, operationally realistic areas.
- Developing upgrades to existing self defense test ship capabilities will be essential to testing the air defense effectiveness of integrated ship combat systems. This T&E capability is essential to at least seven major acquisition programs.

- Developing signature measurement test capabilities to keep pace with system developments. Acoustic, radio frequency, and infrared signature measurement capabilities for naval systems require upgrades to meet the testing requirements of new ships in development.
- Developing adequate supersonic sea skimming threat targets. The navy faces a critical shortage of supersonic sea-skimming missile targets.
- Developing adequate multiple small craft test capabilities. The Navy lacks the ability to adequately test sensor and weapon systems against groups of small craft representing today's littoral threat.

CHEMICAL AND BIOLOGICAL DEFENSE

T&E capability challenges in the area of chemical and biological defense systems include:

- Developing adequate and sufficient chambers to support live agent testing. There are insufficient chambers to accommodate complete end-to-end testing of the detection systems currently under development.
- Developing adequate and sufficient chemical and biological simulants and dispersion models. Current threat simulants and predictive dispersion models are not threat representative.
- Developing adequate and sufficient referee systems. Current referee systems used to establish ground truth during testing lack mobility, are unacceptably slow in data reduction and presentation, or cannot keep pace with the current test load.

OTHER RESOURCE ISSUES

Closure of NASA Wind Tunnels

In the spring of 2003, the National Aeronautics and Space Administration (NASA) inactivated three subsonic wind tunnels at the Ames Research Center in California. Two of those tunnels, the 80 x 120-foot and 40 x 80-foot tunnels, are the world's largest wind tunnels. Together, they comprise the National Full-Scale Aerodynamic Complex (NFAC). The third tunnel is the 12-foot pressure wind tunnel.

Shortly after NASA inactivated the wind tunnels, DOT&E tasked the Institute for Defense Analyses (IDA) to conduct an assessment of the effect that the closure of those facilities would have on DoD and the supporting U.S. aerospace industry. The IDA study found that DoD would be adversely affected by the closure of the NFAC, and that the loss of the NFAC would be particularly detrimental to rotorcraft research and development. It would also eliminate the only wind tunnel in the United States capable of conducting full-scale testing of aircraft. The highest priority recommendation in the IDA study was that DoD take ownership of (or lease) the NFAC from NASA, assume operational responsibility for the facility, and upgrade it to meet the current and future needs of the Department.

The DoD response to date has been an effort to identify the cost of assuming ownership and operation of the NFAC from NASA, as well as the extent of DoD's need for the type of large and full-scale subsonic wind tunnel testing that can only be conducted in this facility. With that information, senior managers in DoD can weigh the costs and benefits of taking control of the facility and decide whether or not to arrange to transfer the facility from NASA to DoD.

Range Encroachment

Encroachment refers to the cumulative result of outside influences that inhibit normal military testing and training. It includes urban sprawl near military areas; loss of frequency spectrum; restrictions on using land, air, and sea space; and migration of endangered species to ranges. A steady increase in encroachment has serious consequences and threatens the use of DoD's test and training ranges.

Of the eight-provisions in the legislative package (submitted to the Congress by the Administration in FY02), five have been passed. Congress has yet to act on the three remaining proposals in the Readiness and Range Preservation Initiative. The three provisions, resubmitted in FY04, reaffirm the principle that military land, marine areas, and airspace exist to ensure military preparedness while ensuring that DoD remains fully committed to its stewardship responsibilities. These three proposals remain essential to the Readiness and Range Preservation Initiative.

Equally important Readiness and Range Preservation Initiative are the outreach efforts with other government agencies, local communities, and non-government organizations in which DoD is engaged. These efforts are strategically focused within DoD but enacted to suit the unique needs of each test or training range within the local area and community. This

has led to valuable partnerships, allowing us to work together to address encroachment issues to the mutual benefit of diverse interests.

DOT&E T&E RESOUCE PROGRAMS

Central Test and Evaluation Investment Program (CTEIP)

CTEIP is an OSD-managed program established to develop T&E capabilities normally considered beyond a single Service's area of responsibility. Its objectives include applying state-of-the-art technology to correct deficiencies in T&E capabilities and improving the efficiency of the test process; improving interoperability and interconnectivity among test facilities and ranges; developing, validating, and integrating modeling and simulation with open-air testing; and developing mobile test instrumentation as an alternative to fixed facilities.

One portion of CTEIP, the Resource Enhancement Project (REP), provides quick-reaction, near-term solutions to test shortfalls in support of ongoing operational test programs. REP funding is appropriate when the timeframe from the definition of need through critical test dates does not allow sufficient time in the budget cycle to fund the required capability through normal Service processes.

Currently, CTEIP has over 50 ongoing projects with total funding budgeted at $388 million over the next three years. DOT&E is taking the initiative to make T&E instrumentation and capabilities being developed under CTEIP available to the training and experimentation communities. We are doing this in collaboration with the Office of the Under Secretary of Defense for Personnel and Readiness and JFCOM. Three of these projects are:

- Test and Training Enabling Architecture (TENA). This project is developing and validating a common architecture and requisite software to integrate testing, training, simulation, and high-performance computing technologies, distributed across many facilities.
- Enhanced Range Application Program (EnRAP). While primarily aimed at improving the accuracy of Time-Space-Position Information by means of an advanced GPS receiver and inertial measurement unit, EnRAP will also improve interoperability by using TENA-compliant interfaces to enhance the ability of test ranges and facilities to draw upon the test resources of other test and training ranges and facilities.
- Advanced Range Telemetry (ARTM). ARTM is focused on developing technology that allows aeronautical telemetry used in testing to more efficiently use the available radio frequency spectrum.

Test and Evaluation/Science and Technology (T&E/S&T)

The T&E/S&T Program transitions technologies from the labs to the T&E community so that test capabilities can keep pace with evolving weapons technology. The Test Technology Area Plan, updated in September 2004, details the overall program. In summary, we continued to address test issues in five critical areas during FY04:

- Hypersonic Test. Develops technologies needed to test air-breathing systems at or above Mach 5. These technologies will support National Aerospace Initiative demonstration schedules and future hypersonic system needs.
- Spectrum Efficient Technology. Develops technologies to better use current telemetry spectrum. Also explores issues related to future use of the Super High Frequency band for telemetry.
- Multi-Spectral Test. Develops technologies needed to test multi- and hyper-spectral sensors and seekers. These technologies will provide realistic multi-spectral simulation of battlefield systems in all types of environments and weather conditions.
- Embedded Instrumentation**.** Develops technologies for smaller instrumentation suites that don't adversely impact systems under test while providing data in support of continuous T&E.
- Directed Energy. Develops technologies needed to assess High Energy Laser and High Power Microwave performance and target interaction to support testing of directed energy weapons.

Threat Systems

DOT&E uses Defense Intelligence Agency (DIA) assets to provide test resource analyses on the availability, capabilities, and limitations of threat representations used for T&E. These DIA assets manage the Threat Simulation

Investment program which sponsors investments toward applying technology and innovations to solve threat representation shortfalls. Through this effort, DOT&E is investing in projects to provide realistic, threat-representative targets and to provide enhanced threat representations for T&E. Projects of particular interest are:

- **Targets**
  - Full-Scale Aerial Targets. The Target Management Initiative (TMI) program funded upgrades to improve low altitude target control and more precise vector miss distance end game scoring to support future missile testing.
  - Sub-scale Aerial Targets. The TMI conducted studies to define modifications required to the existing sub-scale target drone inventory to better represent the current and emerging threat. In addition, the TMI funded multiple projects to provide low altitude target control, surface target scoring, and sub-scale target signature augmentation.
  - Anti-ship cruise missile. A project studied the performance and feasibility of two candidate target systems to address supersonic naval missile threats. Wind tunnel testing on both candidate systems commenced in FY03.
  - Diesel-electric submarine target. The Mobile Acoustic Source project develops a mobile diesel electric submarine simulator with highly robust acoustic and dynamic characteristics for use in high-risk, open-ocean, and shallow water environments.
- **Threat Simulators**
  - Multi-spectral test capabilities. The infrared/ultra-violet end-to-end test requirement study will develop a tri-Service functional design requirement for threat simulators that support testing of aircraft missile warning and infrared countermeasures systems.
  - New threat simulators to evaluate wireless networks for their vulnerability to jamming during unmanned air vehicle operations, to replicate different air-to-air infrared threats for directed countermeasure T&E, and to evaluate missile plumes for more realism in testing missile warning systems and directed infrared countermeasure programs.

International Programs.

DOT&E continues to work with the international T&E community through its International Test and Evaluation Program. The program provides reciprocal access to the test and evaluation resources of the United States and its allies through cooperative agreements. The agreements provide for the cooperative sharing of the cost of testing and the ability to exchange or “loan” equipment between countries. The agreements also allow for “familiarization visits” to foreign ranges, which allows testers and program managers to explore unique capabilities or assets, and provides preferred rates to customers that utilize the agreements.

In FY04, DOT&E concluded negotiations and finalized a cooperative agreement with the Netherlands. With the addition of the Netherlands, there are now four IT&E cooperative agreements in place (Canada, France, Australia, and the Netherlands). In FY05, DOT&E expects to complete negotiations with the United Kingdom, making the British the fifth ally to sign a cooperative T&E agreement with the United States. Over the past two years, besides providing U.S. program managers access to the test capabilities and technologies of our foreign allies, the agreements have also provided over $25 million in revenues to U.S. ranges.

A recent test activity administered through the Canada-U.S. cooperative agreement was the quick reaction testing of various weapon systems mounted on a Stryker platform to support operations in the Middle East. Since no Strykers were available to perform the tests, nearly-equivalent Light Armored Vehicle/Cougar vehicles were loaned by Canada. The results of this test will provide the basis for retrofitting Stryker vehicles with appropriate weaponry for immediate use.

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